

K-6

Primary Science and Technology

# Ecosystems



## Teachers' Guide

# Ecosystems

MODULE 1: K – 2

MODULE 2: 3– 4

MODULE 3: 5– 6

## Preface

The development of learning outcomes for the core curriculum in OECS primary and lower secondary schools is an essential part of the harmonization of OECS educational systems. The curriculum harmonization process commenced seven years ago with discussions between the OECS Education Reform Unit (OERU) and educational personnel in all member countries (See *Eastern Caribbean Education Reform Project: Initiative on curriculum and remediation – Design Mission report, February 1998*).

The initiative in Primary Secondary Science and Technology commenced in 2001, with a meeting of science and technology educators in St. Vincent and the Grenadines. Time was spent initially on defining science and technology, mainly because the primary curriculum concentrated on science only. A working definition has been developed and has been used consistently throughout the development of the programme.

Draft learning outcomes were developed and circulated for comments throughout the curriculum units in the OECS. Subsequent meetings of the working group were held in St. Kitts and Nevis, St. Lucia and Antigua and Barbuda. At each of these meetings teacher educators, teachers and principals formed part of the discussion groups. After the learning outcomes were adopted by the curriculum officers, instructional modules to serve as teachers' guides were planned and developed by members of the working groups. The learning outcomes and modules were all reviewed and edited by the two consultants who worked through all phases of the project.

Time did not permit a formal piloting of the learning outcomes and modules. Since in most cases the same curriculum officer worked on the lower secondary curriculum, also, there is the possibility of the primary curriculum benefiting from the experience gained in the piloting of the lower secondary programme.

The purpose of developing the learning outcomes and instructional modules is to ensure that all children in OECS primary schools attain an acceptable level of knowledge, skills and attitudes associated with science and technology. Each member country retains the right and responsibility for integrating these outcomes into the national primary science and technology curriculum. As usual, teachers will continue to use their initiative and resourcefulness in the implementation of the programme through the use of indigenous resources creating relevance.

The OERU is extremely grateful for the contribution made by all persons and institutions that have been involved in this developmental exercise. First, OERU expresses thanks to the Canadian International Development Agency (CIDA) for the high level of interest shown and the funding provided for the Eastern Caribbean Education Reform Project (ECERP). The Ministries and Departments of Education have contributed resource personnel, accommodation, refreshment, ground transportation, and some materials for workshops. Most important, however, have been the high level of cooperation and commitment to the reform effort displayed by both the administrative and professional sections of Ministries of Education.

The following science education professionals have made significant contribution over the four-year period.

<b>Country</b>	<b>Participant</b>	<b>Designation</b>
<b>Anguilla</b>	Mr. Worrell Brooks	Education Officer, Science
	Mrs. Maria Webster	Secondary School Teacher
<b>Antigua and Barbuda</b>	Mr. Earl Skerritt	Science Coordinator
	Ms. Kendra Thomas	Primary School Teacher
	Ms. Celia Frederick	Secondary School Teacher
	Ms. Gracelyn Ireland	Primary School Teacher
<b>British Virgin Islands</b>	Ms. Beverlie Brathwaite	Education Officer, Science
<b>Dominica</b>	Mr. Frank Newton	Education Officer Science
	Mr. Gerald Corbette	Lecturer, Dominica State College
<b>Grenada</b>	Mr. Jervis Viechweg	Curriculum Officer, Science
	Ms. Janis Henry	Lecturer, T. A. Marryshow Com. College
<b>Montserrat</b>	Mr. Gregory Julius	Primary School Principal

<b>St. Kitts And Nevis</b>	Mr. Hilton Clarke	Curriculum Officer, Science
	Dr. Lincoln Carty	Former Curriculum Officer, Science
<b>St. Lucia</b>	Mr. Winston Blanchard	Curriculum Officer, Science
	Ms. Imelda Polius	Former Primary School Teacher
<b>St. Vincent and the Grenadines</b>	Mrs. Arlene Keane-Browne	Former Curriculum Officer, Science
	Mrs. Amaala Muhammad	Curriculum Officer, Science
	Mr. Kenroy Johnson	Principal, Secondary School

The OERU also expresses gratitude to the dozens of teachers, principals and students who have participated in discussions and consultations.

The actual planning and subsequent developmental process for the learning outcomes and Teacher's Guide became the responsibility of Dr. Cheryl Remy, former Senior Lecturer at Sir Arthur Lewis Community College, St. Lucia and Professor Winston King, Senior Lecturer, School of Education, UWI, to whom the OERU is very grateful. As a team, Dr. Remy and Professor King have encouraged workshop participants and module writers to think and to create ideas as the work progressed.

The staff at OERU together contributed in no small measure to these modules. Ms. Deborah Alphonse, Accounts/Administrative Assistant, Ms. Natasha Deterville, now Secretary to the Director of Economic Affairs in the OECS, and Ms. Cleotha Randolph, Documentation Officer, worked tirelessly arranging workshops and reproducing materials. Ms. Natalie Compton of Nagio Creations competently designed the layout of the modules and learning outcomes for printing and electronic reproduction.

Dr. Henry Hinds, formerly Curriculum Specialist at OERU, was responsible for the curriculum project. Mrs. Lorna Callender and Ms. Candia Alleyne, both former Heads of OERU, have supported the project organizationally and morally. Mr. Johnson Cenac, ECERP Officer, made significant contributions in various ways and at various times throughout the development of this work.

The Primary Science and Technology modules provide an excellent example of the fusion of talent, creativity, rigorous science and technology and cooperation to develop a valuable resource for teachers.

The OERU hopes that principals and teachers will continue to play their roles in making the outcomes and modules come to life in classrooms throughout the OECS. The commitment and effort surely will contribute to the enhancement of knowledge, and skills and the development of positive attitudes towards science and technology.

Henry Hinds, Head, OERU

August, 2006



Ecosystems

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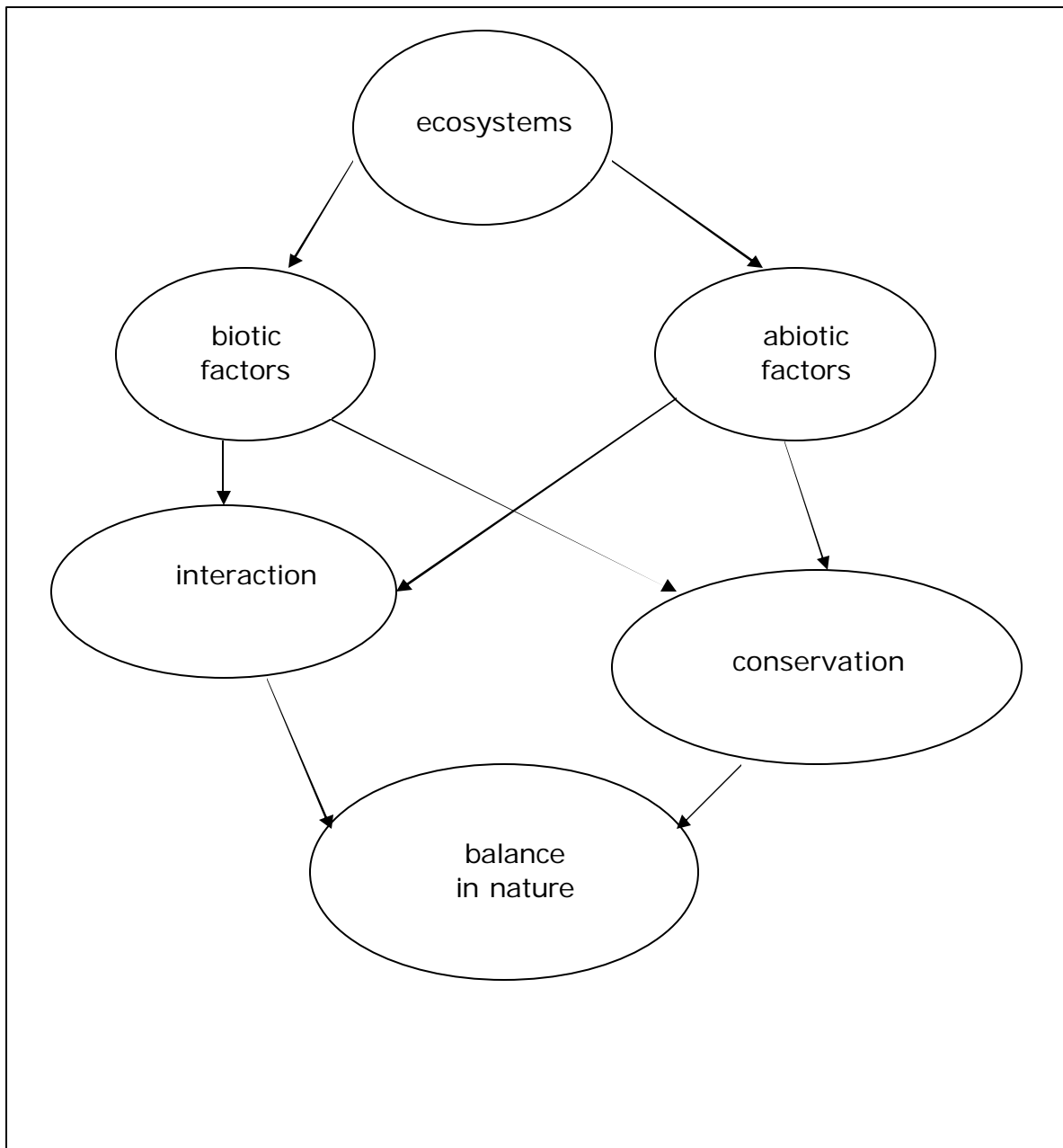
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## INTRODUCTION

This unit involves the investigation of **ecosystems**. It includes the exploration of **biotic** and **a-biotic** factors in the environment. The unit also explores the **interaction** among organisms in the **environment**, together with the impact of **natural effects/processes**. The importance of **conservation** of the **natural resources** is also included.

### Concept map



## Rationale

The importance of local, regional and global ecosystems cannot be over emphasized. Every effort must be made to inculcate in our children the right attitudes towards their surroundings as early as possible. It is only by recognizing the importance of maintaining the balance of nature, and the role that humans play in this endeavour that the best care of our ecosystems will be possible. With this in mind, students should be empowered with the necessary knowledge, attitudes and skills to effectively care for their immediate environments and manage their ecosystems.

## Overview of Unit

An **ecosystem** is an area in nature where all the living and non-living things interact to supply their needs. The living things constitute the **biotic factor** while the non-living things are the **a-biotic** or **physical factor**. Living things **detect** their environment through their **senses**. Within an ecosystem different **animals** have different types of homes called **habitats**. Habitats provide shelter, warmth, protection and food and must be suitable to the needs of the animals. **Aquatic** animals and plants live in water while **terrestrial** animals and plants live on land. There are several types of animals found in Caribbean ecosystems. Some examples are the lizard, humming bird, mongoose and mosquito.

**Plants** also make up a part of the ecosystem. Some common examples are the banana, mango, hibiscus, pumpkin, and coconut. There are many similarities and differences among plants. These include size, colour and shape.

The number of plants or animals of a particular species in a given habitat is the **population** of that species. The term is used in the same way that it is used when referring to the number of people living in a town or village.

Plants and animals interact with each other within the environment, and are interdependent on each other. Green plants make their own food using energy from the sun; they are called **producers**. Animals do not make their own food; they are called **consumers**. Some animals feed only on plants; these are called **herbivores**. Some animals feed only on the flesh of other animals; these are called **carnivores**. Animals that feed on both plants and animals are known as **omnivores**.

An animal that is eaten by another animal is called a **prey**, while the animal that does the eating is called the **predator**. Different animals have special mechanisms that they employ for their own protection. Examples are venom, stings, camouflage and spines. The feeding relationships among organisms in an environment may be represented by simple **food chains** or more complex **food webs**.

In some feeding relationships, both organisms benefit; this is called **symbiosis**. There are some relationships where only one organism benefits; this is **commensalism**. In the feeding relationship called **parasitism**, the organism that is fed on is called the **host** while the organism that feeds is called a **parasite**. The parasite has a negative effect on the host and can make it sick.

Organisms are adapted for survival in their natural habitats. They are able to thrive if there is no interference from humans or natural disasters. Maintaining this **balance** in nature is very important. The balance in nature can be affected by **natural processes** such as **hurricanes**, **earthquakes**, **volcanic eruptions**, **droughts**, and **floods**, and by activities of humans. **Pollution** of air and water sources, **deforestation** and **excavations** of portions of the earth are some of the ways in which humans destroy the balance of nature.

The wise use of our **natural resources** is called **conservation**. Conservation methods include **reducing** waste, **recycling** and **reusing** resources as far as possible. Practising conservation can bring positive results to the environment. One method of reducing waste, while at the same time recycling useful materials, is **composting**. **Compost** is a soil conditioner and fertilizer, the product of the decomposition of animal and plant matter. It is used by gardeners to replenish the **humus** in soil. **Humus** binds soil together and is important in preventing soil erosion. Besides, it provides valuable mineral salts.

**THE EXPERIENCES IN THESE MODULES WILL HELP THE STUDENTS TO DEVELOP THE FOLLOWING MAJOR IDEAS:**

### **ECOSYSTEMS**

**The environment is made up of living and non-living parts.**

**Plants and animals gain information about their environment by using their senses.**

**Animals and plants depend on one another for their survival and existence.**

**Plants and animals adapt to changes in their environment.**

**Natural and human made changes in the environment may start imbalances that require further changes to counteract.**

**Human activity may have a negative impact on the natural environment.**

**Conservation practices help to protect the natural environment.**

### **TECHNOLOGY**

**Technological methods involve the use of problem solving, technological processes and resources to find solutions to people's wants and needs.**

**Technology is a human activity.**

**Individuals can take part in Technological activity.**

**Technology involves the uses of materials, energy, tools/machines and information.**

**Technology processes include Biotechnology, Production Technology and Transportation.**

**Technology changes over time.**

**Technology is neither good nor bad, but the way we use it can have positive or negative effects on our lives.**

**The use of technology has side effects.**

### **SCIENCE TECHNOLOGY, SOCIETY AND THE ENVIRONMENT**

**Science and Technology affect human life, the society and the environment.**

**The impact of Science and Technology can be positive and negative, unplanned or planned, immediate or delayed.**

**There should be sustainable use of resources and efforts should be made to minimize ecological disturbances.**

**People's values, beliefs and attitudes influence Scientific and Technological activity and use.**

Ecosystems  
module 1  
grades k - 2

**GRADE K-2  
GENERAL OBJECTIVES**

The students should be able to:

1. Recognize that animals and plants are living things that depend on each other for their survival.
2. Become aware of different plants and animals and their varying needs for food, shelter and protection.
3. Investigate the habitats and environments of plants and animals.
4. Develop and demonstrate a caring attitude toward animals, plants and other resources in the environment.
5. Appreciate the importance of conservation in maintaining balance in the environment.
6. Recognize the importance of clean air and water for the maintenance of life on Earth.
7. Be aware of safety issues and exercise precautionary measures that limit the risk of harm to oneself, others and the environment.
8. Understand that plants and animals gain information about their environment by using their senses.
9. Appreciate the use of the different sense organs in receiving information.
10. Recognize that plants and animals are interdependent and that they possess natural defences to help them to survive in the wild.
11. Understand the term, adaptation, in relation to interdependence.
12. Appreciate the importance of every part of the ecosystem in maintaining the environment.



## **SPECIFIC OBJECTIVES**

The students should be able to:

1. Name and identify some common pets.
2. Identify the foods that different pets eat.
3. Describe and demonstrate appropriate ways of treating their pets.
4. Identify precautionary measures that should be employed to maintain safety to self, others and environment, and the pet itself, when a pet is present.
5. Identify homes/habitats of animals and plants.
6. Observe homes of different types of animals.
7. Determine how each home satisfies the needs (e.g. food, shelter, protection) of the animals that live there.
8. Compare human and animal homes for similarities and differences.
9. Appreciate the importance of caring for plants and animals and the environment in which they live.
10. Investigate how organisms adapt to their habitats.
11. Identify some features of organisms that are designed to enable their survival in their habitats.
12. Appreciate that organisms are adapted to survive in their natural environments/ecosystems.
13. Distinguish between actions that harm a habitats/ an environment from those that preserve it.
14. Demonstrate how one would care for habitats/the environment.
15. Identify and predict actions that could harm named habitats/the environment.
16. Observe a plant and identify the main parts.
17. Classify plants (size, shape of leaves, flowering and non-flowering).

18. Name the process of initial seed growth (germination).
19. State in simple terms the conditions necessary for seed growth.
20. Discuss different uses of plants in the society.
21. Describe how animals and plant parts can be processed into certain foods.
22. Identify/name plants found in your country.
23. Classify plants as food, ornamental (decorative), shelter etc.
24. List animals found in your country.
25. State features of different animals.
26. Classify animals as domesticated, wild and useful.
27. Discuss/explain what endangered species are and give examples of them.
28. Outline ways to protect endangered species, e.g. (laws; changing human behaviour).
29. Name and identify each sense organ.
30. State what stimulates each sense.
31. Identify different stimuli that affect the senses.
32. Name the organ that is stimulated by sounds.
33. Classify sounds by pitch and loudness.
34. Construct and use simple musical instruments.
35. Identify some ways in which plants and animals depend on each other (e.g. feeding, pollination, shelter, protection).
36. Describe how some named organisms depend on each other.
37. Compare feeding habits of organisms (*herbivores, etc.*)
38. Identify feeding relationships amongst organisms (*use terms: herbivores, etc.*).
39. Investigate predator-prey relationships.

40. Construct simple food chains to represent the feeding relationships among plants and animals.
41. Identify natural defences that animals use to help them survive (spines, camouflage, etc.).
42. State different uses of water and give examples. Define drought and discuss its effects.
43. Discuss some ways in which water may be polluted.
44. Identify ways in which water may be conserved.
45. Appreciate that clean water is very important to human life, and participate in its conservation.
46. Identify items of litter around the school.
47. Group the litter according to size, colour, material it is made of (bottles, cans, paper, plastic, food waste), recyclable and non-recyclable.
48. Explain the dangers of litter (on a simple scale e.g. attracting animals with diseases, broken glass causing injury, etc).
49. Discuss how the problem of litter in schools could be avoided.
50. Trace garbage to its final destination.
51. State the meaning of solid waste.
52. Identify methods of managing solid wastes in the home/school/community (recycling, etc.).
53. Organize and participate in clean-up projects.
54. Construct a toy using discarded materials/items.
55. Define the term, environmental destruction.
56. Investigate the factors that result in environmental destruction.
57. Identify some ways in which environmental destruction may be prevented.

**LEVELS OF ATTITUDES, SKILLS & TECHNOLOGY EXPECTED AT GRADES K - 2**

**ATTITUDES:**

**Students should be encouraged to:**

<b>Curiosity:</b>	<ul style="list-style-type: none"><li>✓ Ask questions about objects and events.</li><li>✓ Find out more about events and objects on their own.</li></ul>
<b>Inventiveness:</b>	<ul style="list-style-type: none"><li>✓ Suggest new ways of doing things.</li></ul>
<b>Respect For Evidence</b>	<ul style="list-style-type: none"><li>✓ Explain their results and conclusions.</li><li>✓ Listen to other students' results and explanations.</li></ul>
<b>Persistence</b>	<ul style="list-style-type: none"><li>✓ Complete activities.</li><li>✓ Persist at tasks.</li></ul>
<b>Respect For Living Things</b>	<ul style="list-style-type: none"><li>✓ Show sensitivity to living things.</li></ul>
<b>Cooperation</b>	<ul style="list-style-type: none"><li>✓ Share with others.</li><li>✓ Work together with others.</li></ul>
<b>Concern For Safety</b>	<ul style="list-style-type: none"><li>✓ Observe safety instructions.</li></ul>

**SKILLS: In developing their skills of inquiry, problem solving and design, the students are expected to:**

<b>Observing</b>	<ul style="list-style-type: none"> <li>✓ Use as many senses as are appropriate and safe to gather information.</li> <li>✓ Identify differences and similarities between objects and events.</li> <li>✓ Identify sequence in events.</li> </ul>
<b>Measuring</b>	<ul style="list-style-type: none"> <li>✓ Use simple measuring instruments or models of measuring instruments. At first use comparative terms such as bigger, smaller and later use actual figures.</li> </ul>
<b>Manipulating</b>	<ul style="list-style-type: none"> <li>✓ Set up simple experiments to compare results.</li> <li>✓ Manipulate simple equipment.</li> </ul>
<b>Recording</b>	<ul style="list-style-type: none"> <li>✓ Use pictures and charts to report results.</li> <li>✓ Fill out simple tables to report results.</li> </ul>
<b>Classifying</b>	<ul style="list-style-type: none"> <li>✓ Group objects according to one or two criteria.</li> </ul>
<b>Communicating</b>	<ul style="list-style-type: none"> <li>✓ Talk freely about their activities and the ideas they have, with or without making a written record.</li> <li>✓ Use appropriate vocabulary to describe their observations.</li> <li>✓ Listen to others' ideas and look at their results.</li> <li>✓ Report events by using demonstrations, role play, simple drawings, paintings and simple sentences.</li> </ul>
<b>Inferring</b>	<ul style="list-style-type: none"> <li>✓ Notice patterns in simple measurements and events.</li> </ul>
<b>Interpreting data</b>	<ul style="list-style-type: none"> <li>✓ Discuss what they find out in response to questions.</li> </ul>
<b>Experimenting</b>	<ul style="list-style-type: none"> <li>✓ Freely ask a variety of questions and suggest how they might be answered.</li> <li>✓ Suggest how they could investigate to find out answers to questions.</li> </ul>
<b>Predicting</b>	<ul style="list-style-type: none"> <li>✓ Attempt to make predictions (even if not based on patterns).</li> </ul>
<b>Problem Solving</b>	<ul style="list-style-type: none"> <li>✓ Suggest solutions to simple problems.</li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>✓ Construct models either by following instructions or by using their own designs.</li> <li>✓ Select appropriate material to make models and gadgets.</li> </ul>

<b>Technological Methods</b>	<ul style="list-style-type: none"> <li>✓ Given problems, the students will be able to discuss and make simple gadgets.</li> </ul>
<b>Nature of Technology</b>	<ul style="list-style-type: none"> <li>✓ Realize that people use natural things and also make others things from them.</li> <li>✓ Realize that they can design and make things which may be different from what others make.</li> <li>✓ Share information with others.</li> <li>✓ Realize that safety is important in using tools and making things.</li> </ul>
<b>Use of Technology</b>	<ul style="list-style-type: none"> <li>✓ Appreciate the use of devices, tools and structures made by humans in the home and community.</li> <li>✓ Appreciate the advantages of using these products.</li> <li>✓ Realize that human-made things can pollute the environment.</li> </ul>

## Unit: ecosystems (grade K)

### **Topic: Animals/Pets**

### **Duration : 2 Lessons**

### **Specific Objectives:**

Students should be able to :

1. Name and identify some common pets.
2. Identify the different foods for different pets.
3. Describe and demonstrate appropriate ways of treating their pets.
4. Identify precautionary measures that should be employed to maintain safety to self, others and environment and the pet itself when a pet is present.

### **Process Skills**

Communicating (Listening, Oral expression, Dramatizing), Observing

### **Materials**

Pictures (*of children's pets*)

Video (*pet care*)

Worksheets (*match pets with their preferred foods and habitats*).

Leash

Hair brush

Water (feeding bowls)

Grass

Dog

Food container

Bird cage

### **Content Summary**

Pets are animals that are kept in domestic situations. Investigating different animals that are kept as pets allows young students to learn about the needs of animals, such as food, shelter and protection. Improper handling (grabbing, teasing, beating, etc.) of pets can be harmful to the person or pet involved. An animal's home is called its habitat.



## **Suggested Activities**

1. Bring their pets, or a model/picture of a pet and talk about them. Have discussion about caring for pets.
2. Go on field trips to veterinary clinic and/or humane society for animals.
3. Interact with invited resource person (e.g. veterinarian) to learn more about care for and safety around animals.
4. View video(s) on pet care.

## **Assessment**

1. Divide class into small groups and let students perform role playing to demonstrate proper care for their pets.
2. Show pictures of pets and let pupils identify the animals.
3. Worksheet (*Match pets with their preferred food and habitats*)

## **Topic: Plants**

**Duration: 2 Lessons**

### **Specific Objectives**

Students should be able to:

1. Observe a plant and identify the main parts.
2. Classify plants (size, shape of leaves, etc.)
3. Name the process of initial seed growth (germination).
4. State in simple terms the conditions necessary for seed growth.

### **Process Skills**

Observing, Classifying, Communicating, (Discussion, Oral expression), Manipulating, Investigating, Predicting, Recording

### **Materials**

Plant samples	Seeds
Pictures of plants	Water
Worksheet	Crayons
(diagram of plant for matching plant parts to their respective names).	Drawing paper
Transparent Containers	
Tissue paper	

### **Content Summary**

Plants make up a part of the environment. Some common examples are beans, banana, mango, hibiscus, pumpkin and coconut. There are many similarities and differences among plants. These include size, colour and shape. Some plants can be grown from seeds. The initial growth of a seed (from seed to seedling) is called germination. Conditions such as warmth, moisture and air are necessary for seeds to germinate.

### **Suggested Activities**

1. Go on nature walk to observe plants. Collect samples and talk about them. Describe plants; identify main parts.

2. Examine a variety of pictures of plants and sort them according to features.
3. Listen to the poem, "In the heart of a seed".
4. Prepare transparent container with tissue and set 2 or 3 seeds and discuss growth (*growth may be recorded pictorially*).
5. Prepare seeds for germination, this time controlling the conditions (no water, no air, refrigerate) and observe whether or not they grow.

### **Assessment**

1. Give students work sheets with pictures of plants on which they will match each plant part to its name.
2. Give students a set of pictures of plants to sort by specified features.
3. Elicit from students the name of the process of initial growth and conditions needed for seeds to grow.
4. Let students draw a plant and label specific parts.

## **Topic: The Senses**

### **Duration: 2 Lessons**

### **Objectives:**

Students should be able to:

1. Name and identify each sense organ.
2. State what stimulates each sense.
3. Identify different stimuli that affect the senses.

### **Process Skills**

Observing, Communicating, Observing, Manipulating, Predicting,

### **Materials**

Charts/pictures of sense organs  
Instruments and other sound-making objects  
Light/dark box (shoe box)  
Recorded familiar sounds  
Fruits  
Objects of various textures  
Scented materials

### **Content Summary**

We use our senses to detect what is in our environment. There are five senses: seeing, hearing, smelling, touch/feeling and tasting. Eyes are for seeing, ears are for hearing, nose/nostrils for smelling, skin for feeling or touch, and the tongue is for tasting.

### **Suggested Activities**

1. Sing songs such as “Watch your eyes” (to reflect different sense organs).
2. Participate in chart/picture reading and discussions to highlight sense organs and their respective stimulus.

3. Carry out experiments:
  - i) light and dark box
  - ii) making sounds (using objects or instruments)
  - iii) 'Feelie' Fun box
4. Discuss characteristics of different stimuli, eg. sweet vs sour foods.
5. Go on observation walk with teacher and afterwards discuss stimuli observed/experienced: sounds heard, texture of objects, etc.
6. Play games (eg. guess what makes that sound; guess what fruit is this?). Students use senses of smell and touch to suggest answer.

## **Assessment**

1. Ask students to state the 5 sense organs and stimuli for each sense.
2. Let students describe the difference between looking in the dark and looking when there is light.
3. Ask students to identify a range of familiar sounds, smells and tastes.
4. Ask students to identify sources of sounds.
5. Assess correctness/appropriateness of responses to questions during activity sessions.

## **Topic: Conserving our Water Resources**

**Duration: 2 Lessons**

### **Specific Objectives**

Students should be able to:

1. State two different uses of water.
2. Give a simple definition of drought and discuss its effect.
3. Discuss some ways in which water may be polluted.
4. Identify ways in which water may be conserved.
5. Appreciate that clean water is very important to human life and participate in its conservation.

### **Process Skills**

Observing, Communicating (Oral expression, Listening, Discussing)

### **Materials**

Distilled water

Transparent containers

Video (*water pollution/contamination*)

Worksheets (pictures of water being wasted or conserved, and rainy season vs. drought)

Crayons

### **Content Summary**

Water is one of the most important natural resources. Care must be taken to conserve this resource, by preventing its contamination and/or wastage. Water may be conserved by recycling/reusing it and by setting limits on its consumption/usage.

## **Suggested Activities**

Students will do the following

1. Examine a sample of distilled water and discuss their findings (colour, smell, taste).
2. Discuss ways in which water is used (use pictures to stimulate).
3. View pictures/video showing water being contaminated/polluted and discuss the ways in which water is made unclean.
4. View and compare pictures of environment during rainy season vs. drought.
5. Learn poems or jingle about water conservation.
6. Talk about the effects of drought on everyday life and suggest ways in which they can help to conserve water.

## **Assessment**

1. Ask students to give the main uses of water.
2. Use worksheets with pictures and let students indicate whether water is being wasted or conserved.
3. Elicit from students the meaning of drought and how it affects everyday life.
4. Let students make rules about water conservation.



## **Topic: Habitats of Animals**

### **Duration: 3 Lessons**

### **Specific Objectives**

Students should be able to:

1. Identify places where animals live.
2. Observe homes of different types of animals.
3. Determine how each home satisfies the needs (e.g. food, shelter, protection) of the animals that live there.
4. Compare human vs. animal homes for similarities and differences.

### **Process skills**

Observing, Communicating (Oral expression, Oral communication, Illustrating/drawing), Classifying

### **Materials**

Worksheets (pictures of common animals and their habitats-matching)  
Pictures (animals and habitats)  
Objects ( from habitats of animals)

### **Content Summary**

The habitat of an animal is where it lives. Animals live in different places (land, sea, swamp, river, on trees, in nests, holes in the ground, etc.). Humans usually build houses in which to live.

### **Suggested Activities**

1. Walk around the school compound and observe homes where animals live. For each habitat, discuss how it satisfies the animal's needs.
2. Draw a picture of a home they observe and describe what it illustrates.
3. Sort objects presented, to them into those that make up human homes and those for animals homes (objects such as dolls' furniture, bits of grass, leaves, etc. may be presented to children). Discuss any objects which may be used in both types of homes.

4. Discuss other similarities and differences between human vs. animal homes.
5. Go on a field trip to a wetland (e.g. mangrove swamp, pond, etc.) and observe the animals that live there.

## **Assessment**

1. Prepare a worksheet with pictures of the animals studied and pictures of their habitat (e.g. spider & web). Let students determine which habitat belongs to which animals, and then colour them with the same crayon. Use a different colour for each pair.
2. Show students a large picture of a habitat (or draw this on the board) and have them discuss how this habitat provides what the animal needs. Include habitat for humans.

## **Topic: Pollution + Care/Respect for Habitats**

### **Duration: 3 Lessons**

### **Specific Objectives**

Students should be able to:

1. Distinguish between actions that harm habitats/the environment from those that preserve it.
2. Demonstrate how one would care for habitats/ the environment.
3. Identify and predict actions that could harm named habitats/the environment.

### **Process Skills**

Communicating, Predicting,

### **Materials**

Glue  
Paper  
Seedlings  
Soil  
Plant pots

### **Content Summary**

Some actions are harmful to habitats/the environment while others are not. People should avoid the harmful practices in order to preserve habitats/the environment.

### **Suggested Activities**

1. Role-play 'A day in the life of a Tree'; pretend they are trees and act out the emotions they feel in response to certain incidents (e.g. watering, cutting down, garbage thrown nearby, hurricanes).
2. Discuss/review how to care for plants and animals (according to their needs) and predict what will happen in the absence of proper care.
3. Demonstrate the following through group work; plant two seedlings and leave another on the counter. Care for one of the planted seedlings but not the other. Observe them at the end of a specified time and discuss observations.

4. Gain a greater appreciation of what litter is by collecting different types of litter from school compound. Glue samples from collection to a blank sheet of paper. Each student names one type of litter found until every type has been listed. Record answers on board. Refer to list and ask students to identify sources of litter.
5. Discuss how litter may be harmful to environment (include plants, animals, people and physical environment).

## **Assessment**

1. Prepare skit where students will perform different roles to show effect of littering and other types of harmful practices on the life of a specified plant, animal and on humans.
2. Ask students for suggestions for preventing littering.

## **Topic: Interactions Between Plants and Animals**

**Duration: 2 Lessons**

### **Specific Objectives**

Students should be able to:

1. Identify some ways in which plants and animals depend on each other (e.g. feeding, pollination, shelter, protection).
2. Describe how some named organisms depend on one another.

### **Process skills**

Observing, Communicating (Oral expression, Discussing, Listening)

### **Materials**

Video/posters (plant and animal interaction)  
Worksheets (to assess plant and animal interaction-matching)  
Drawing Paper  
Crayons

### **Content Summary**

Plants and animals interact with each other within the environment and are interdependent.

Green plants make their own food using energy from the sun. Animals do not make their own food. Plants and animals depend on each other. Animals feed on plants; they also get protection/shelter from plants. Plants benefit when animals help to scatter their seeds and pollinate flowers.

### **Suggested Activities**

1. Go on field trips/walks and observe animals and plants in the environment; teacher elicits from students any interactions that are taking place.
2. Watch video/posters illustrating specific examples of plants/animal interactions. Discuss what was seen in video/posters and give other examples that they may know.

## **Assessment**

1. Complete worksheet with pictures of some animals and the plants with which they interact. Match animals to the plants with which they are typically associated.
2. Give an oral account of how known animals and plants depend on each other.
3. Make a drawing of a plant and animal helping each other; let students orally describe what they have drawn.

Unit: ecosystems (grade 1)

## **Topic: Local Plants and Their Uses**

**Duration: 2 Lessons**

### **Specific Objectives**

Students should be able to:

1. Discuss different uses of plants in the society.
2. Describe how plants and plant parts can be processed into certain foods.
3. Identify/name plants found in your country.

### **Process Skills**

Observing, Communicating, Classifying.

### **Materials**

Pictures (for 'I Spy' game)  
Pictures of plants  
Plants  
Seeds  
Flowers  
Roots  
Leaves

### **Content Summary**

The **plants** found in the country are used in various ways and for different purposes, such as for food, clothing, building materials, craft, etc.

### **Suggested Activities**

1. Go on a nature walk/field trip and observe plants in the environment. Identify some plants they see by naming them.
2. Discuss where some plants can be found (seaside, home, garden, etc.).

3. Work in groups to classify plants according to their uses (food, clothing, shelter, medicine, decoration).
4. Make certain products from plants, e.g. drinks, popcorn, tamarind ball, 'ashum', etc.

## **Assessment**

1. Present picture/plants and play a game, '**I Spy**'. Teacher tells students to identify the plant that can be used for a specific purpose.
2. Present students with picture of plants and products that can be made from these plants. Students match the plants to their products.



## Topic: Our Local Animals

### Duration: 4 Lessons

### Specific Objectives

Students should be able to:

1. List animals found in their country.
2. State features of different animals.
3. Discuss/explain what endangered species are and give examples of them.
4. Outline ways to protect endangered species. E.g. (laws; changing of human behaviour).

### Process Skills

Observing, Recording, Communicating (Explaining, Oral discussion, Listening)

### Materials

TV, VCR with appropriate film/cassette  
Poem  
Pictures of animals (general)  
Tables (templates)  
Pictures of animals (endangered species).  
Charts (living and non-living things)

### Content Summary

There are several types of animals found in your country. Some examples are lizard, humming bird, mongoose and mosquitoes. **Aquatic** animals live in water while **terrestrial** animals live on land. Some animals are in danger of being wiped out altogether; these are called endangered species.

### Suggested Activities

1. Observe various living things and identify those that are animals.
2. Investigate to find out the names of the animals in their country and list them. Find out if any are endangered.
3. Listen to address by guest speaker on the topic of local animals and discuss. Pose questions to guest speaker.

4. Observe animals in their communities and natural habitats.
5. Hold class discussion on the habitats of familiar animals.

## **Assessment**

1. Oral questions.
2. Give example(s) of endangered species in your country.
3. Name three animals that live on land and three that live in the sea.
4. Let students create their own poem based on endangered species.
5. Group/colour animals according to type of habitat (*aquatic or terrestrial*).
6. Complete a project, which entails collecting pictures of named endangered and other species of animals.
7. Students act out how the animals outlined in their lesson move around.
8. Using a table, students put pictures of animals under the headings of (a) Endangered (b) Not endangered.

## Topic: Feeding Habits of Organisms and Food Chains

### Duration: 2 Lessons

### Specific Objectives

Students should be able to:

1. Compare feeding habits of organisms (e.g. herbivores, etc. Do not use terms).
2. Construct simple food chains.

### Process Skills

Observing, Communicating (Oral expression, Listening, Explaining),  
Classifying, Constructing

### Materials

Pictures (to use in food chains)  
Tables (templates for classifying animals and plants)  
Pictures (habitats of plants and animals)  
Plants  
Pets  
Reading materials (animal stories)

### Content Summary

Animals do not make their own food. Some animals feed only on plants. Some animals feed only on the flesh of other animals. Some animals feed on both plants and animals; These animals are omnivores.

Green plants make their own food using energy from the sun. The feeding relationships among organisms in an environment may be represented by simple **food chains**.

### Suggested Activities

1. Distinguish through discussion the feeding habits of familiar animals.
2. Identify herbivores, carnivores and omnivores based on the profile given of the feeding habits of uncommon animals (*Play 'What am I?' game*).

3. Given pictures of the following, pupils construct food chains: sheep, grass, rat, nuts, bird, human, chicken, mongoose, corn.
4. List two animals that (i) eat plants only (ii) eat flesh only (iii) eat both. Discuss where (i) plants get their food (ii) animals get their food.

## **Assessment**

1. Students will name examples of herbivores, carnivores, omnivores (*do not use terms*).
2. Give examples of plants and animals and volunteers will say what eats them.
3. Draw food chains on the chalk board (*individual students*).
4. Students will complete a project in which pictures of animals and plants are grouped by category (feeding habit, producer, consumer, etc.)

## Topic : Habitats

### Duration: 2 Lessons

### Specific Objectives

Students should be able to:

1. Identify homes/habitats of animals and plants.
2. Classify animals as domesticated, wild and useful.
3. Classify plants as food, ornamental/decorative, shelter etc.
4. Appreciate the importance of caring for plants and animals and the environment in which they live.

### Process Skills

Observing, Manipulating, Communicating, Classifying

### Materials

Slides (pictures of plants/animals in their habitats)

Video (documentary on plants/animals habitats)

Movies ('Born Free', the 'Lion King', etc.)

### Content Summary

The place where an organism lives is called its habitat. Habitats are suited to the needs of the organisms that dwell in them. Some habitats are **terrestrial**; they are on land. Other habitats are **aquatic**; they are found in water. Humans have brought certain animals and plants under their care (domestication) for several reasons, e.g. to help with work, or for food, or as pets.

### Suggested Activities

1. Identify homes of plants and animals using pictures and previous knowledge.
2. Classifying animals (domestic/wild, useful for food, clothing, etc.). Match to their use.
3. Discuss importance of caring for the habitats of plants and animals.

4. Read/listen to story related to topic.
5. Conduct field trips to various sites/habitats of animals and plants (e.g. ponds, mangroves, etc.).
6. 'Pour a pond': Collect a bucket of water from a pond. Include plant and animal species and other items commonly found in pond water. Simulate a pond by pouring the water on to a clear, vinyl table cloth (edges are rolled so the water stays in place). Students explore the pond in the same way they would in nature (*find different species; examine specimens with a simple microscope/hand lens, etc.*)
7. Watch a relevant film.
8. Learn/recite relevant poem(s).
9. Conduct show and tell activities about habitats of plants and animals, and of experiences in protecting these animals/plants and their habitats.

## **Assessment**

1. Make sentences about habitats of plants/animals.
2. Completion tasks/tests (oral/written) to test knowledge, understanding and values regarding habitats and protection of plant and animal life.
3. Grade 'Show and Tell' presentations.

## Topic: Litter/Littering

Duration: 2 Lessons

### Specific Objectives

Students should be able to:

1. Identify items of litter around the school.
2. Group the litter according to size, colour, material it is made of (bottles, cans, paper, plastic, food waste), recyclable and non-recyclable.
3. Explain the dangers of litter (on a simple scale, e.g. attracting animals with diseases, broken glass causing injury etc.)
4. Discuss how the problem of litter in schools could be avoided.
5. Trace garbage to its final destination.

### Process Skills

Observing, Classifying, Communicating,

### Materials

Box or bag  
Worksheet  
Pictures  
Glue  
Pair of scissors  
Garbage bin  
Waste basket  
Paper

### Content Summary

One way of **polluting** the environment is by littering. **Litter** refers to articles (**garbage**) that are thrown or left in places where they do not belong. Polluting the environment by **littering** can be very harmful. **Disposing** of garbage and unwanted articles in the proper ways can go a long way to keep our environment **clean** and **healthy**. Items may be classified as **recyclable** (can be re-used in the same or different form) and **non-recyclable**.

## **Suggested Activities**

1. Listen to and participate in discussion by resource person on the impact of littering and the benefits of recycling.
2. Participate in a stacking hunt: students go around the school and pick-up litter. Bring it into the classroom and: (i) sort them into different categories (size, colour, material); (ii) find ways in which the items can be used.
3. Visit a landfill to view the final destination of discarded items.
4. Participate in a school clean-up project and/or class clean-up (each child will be given a day in which he/she will be responsible for the cleaning of the class).

## **Assessment**

1. Complete worksheet: classify pictures of recyclable and non-recyclable items into their respective groups.
2. Students work in-groups on a project simulating the littering process (e.g. person-bin-truck-landfill).
3. Class discussion on littering.
4. Students make recommendations on how to cope with/decrease the practice of littering.



## Unit: ecosystems (grade 2)

### Topic: Adaptation of Organisms to their Environments

#### Duration: 2 Lessons

#### Specific Objectives

Students should be able to:

1. Investigate how organisms adapt to their habitats.
2. Identify some features of organisms that are designed to enable their survival in their habitats.
3. Appreciate that organisms are adapted to survive in their natural environments/ecosystems.

#### Process Skills

Observing, Investigating, Constructing

#### Materials

Video (*documentary on adaptation*)

#### Content summary

**Adaptation** is a **characteristic** that improves an organism's ability to **survive** and reproduce in a particular habitat. For example: fishes are streamlined so that they can glide through water; they also have **fins** so they can swim. Mangroves have **prop roots** to support them from shifting/falling over in the soft soil.

#### Suggested Activities

1. Examine plant and animal specimens to see what features they possess and associate the features with the organisms' habitats.
2. Describe the features of different animals and plants that make it possible for them to live in their particular habitats.

3. Match the movement of animals with the type of appendages they possess (e.g. legs for walking, wings for flying, etc.).

## **Assessment**

1. Give oral report on adaptation of a familiar organism.
2. Write a story about how a specified plant/animal is able to survive in its environment.
3. Match the type of motion animals have with named features.

## Topic: Feeding Relationships and Defence (in animals)

Duration: 2 Lessons

### Specific Objectives

Students should be able to:

1. Identify feeding relationships among organisms (*use terms: herbivores, etc.*).
2. Investigate predator-prey relationships.
3. Construct simple food chains to represent the feeding relationships among plants and animals.
4. Identify natural defences that animals use to help them survive (spines, camouflage, etc.).

### Process skills

Observing, Investigating, Constructing

### Materials

Worksheets (*animals to type of defence*)

### Content summary

Some animals feed only on plants; these are called **herbivores**. Some animals feed only on the flesh of other animals; these are called **carnivores**. Animals that feed on both plants and animals are known as **omnivores**.

Green plants make their own food using energy from the sun; they are called **producers**. Animals do not make their own food; they are called **consumers**. Consumers are **primary**, **secondary** or **tertiary**.

An animal that is eaten by another animal is called a **prey**, while the animal that does the eating is called the **predator**. Different animals have special mechanisms that they employ for their own protection. Examples of **defence** mechanisms are **venoms**, **stings**, **camouflage** and **spines**. The feeding relationships among organisms in an environment may be represented by simple **food chains**.

## **Suggested Activities**

1. Carry out 'Animal Interviews' in which students pretend to be different familiar animals. Ask the 'pretend animals' to say what they eat, and where the eaten (plant/animal) got its food. Record the information representing the food chain on the chalkboard.
2. Arrange the flash cards to represent food chains showing the pretend animals' feeding relationships.
3. View a relevant episode of (Wild Safari/Animal Stories/Umba Macomba/Animal Planet) on television.

## **Assessment**

1. Grade flash card activity.
2. Construct food chains from given list of organisms.
3. Match animals to their respective defence mechanism (bees, frogs, cats, lizards, etc).

## Topic: Effects of Environmental Destruction

### Duration: 2 Lessons

### Specific Objectives

Students should be able to:

1. Define the term, environmental destruction.
2. Investigate the factors that result in environmental destruction.
3. Identify some ways in which environmental destruction may be prevented.

### Process Skills

Observing, Communicating, Predicting, Classifying

### Materials

Red and green labels  
Pictures  
Slogans  
Newspaper clippings  
Garbage bins  
Waste paper baskets

### Content summary

When the environment is **destroyed**, the people, animals and plants in it are affected negatively. The negative effects may be **lack of food and shelter**. Organisms become **endangered**, and there may be the threat of death or even **extinction** of some species.

### Suggested Activities

1. Discuss some of the ways in which the environment may be destroyed whether by human or by nature itself.
2. Visit an area in the community or the island that exemplifies environmental destruction.
3. Observe, predict and/or discuss effects of environmental destruction using pictures.

4. Place a red (for unhealthy environs) or green (for healthy environs) label on the relevant parts of their school/class/community compound and then develop strategies to convert red label areas into green label areas.
5. Read prepared literature relevant to topic.

### **Assessment**

1. Explain orally the term 'environmental destruction' and give examples.
2. Group work: let students prepare posters depicting an example of environmental destruction, its causes, effects and a solution (if possible).
3. Simple test in which students list ways in which the destruction of the environment negatively affects life.

## **Topic: Solid Waste Management**

*(Integration of Life Science: Ecosystems, and Earth and Space Science: Earth's Resources)*

### **Duration: 2 Lessons**

### **Specific Objectives**

Students should be able to:

1. State the meaning of solid waste.
2. Identify methods of managing solid wastes in the home/school/community (recycling, etc.).
3. Discuss how the problem of litter in schools could be avoided.
4. Organize and participate in clean-up projects.
5. Construct a toy using discarded materials/items.

### **Process Skills**

Constructing, Communicating

### **Materials**

Discarded items (*for making toys*)

Video (*solid waste management documentary*)

Resource person (*solid waste management department*)

### **Content summary**

Articles that are **discarded** and any solid **waste materials** or garbage need to be properly handled if the environment is to remain **clean** and **healthy**. This is known as solid waste management. In most communities there is a **solid waste management** department that runs a solid waste management programme. Individuals must play their part to ensure that such efforts are effective. Controlling littering is one of the ways in which we can contribute to the proper management of solid waste in our homes, schools and communities.

## **Suggested Activities**

1. View documentary about solid waste management.
2. Interact with resource person who makes a presentation on solid waste management.
3. Discuss how the problem of litter in the school could be avoided.
4. Organize and implement school/community clean-up projects.
5. Construct a toy using discarded materials/items.
6. Hold mini-exhibition of toys that were constructed (*class or school level*).

## **Assessment**

1. Teacher-made test.
2. Write poem/song about solid waste management.
3. Create posters depicting Do's and Don'ts for a litter-free environment.
4. Grade plan and implementation of group clean-up efforts.
5. Grade toys that were constructed from 'throw-away' items.



## **Topic: Making Different Sounds/Musical Instruments**

**Duration: 2 Lessons**

### **Specific objectives**

Students should be able to:

1. Name the human organ that is stimulated by sounds.
2. Classify sounds by pitch and loudness.
3. Construct and use simple musical instruments.

### **Process Skills**

Observing, Classifying, Communicating, Manipulating

### **Materials**

Cans  
Bottles  
Seeds  
Bottle caps  
Wire  
Pliers

### **Content summary**

The ear is the organ that detects **sound**. A sound may be soft or loud, or its pitch can be high or low. Different **musical instruments** make different sounds. The **quality** of a sound is what distinguishes it from all other sounds.

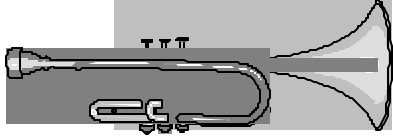

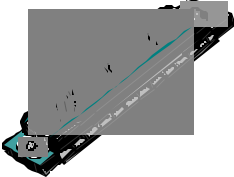
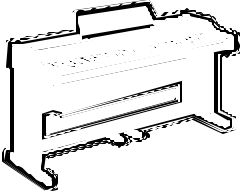

### **Suggested Activities**

1. Students make simple musical instruments and experiment with them to make different sounds.
2. Students predict the pitch of the sound that dropped objects would make, and then test to see if they were right.
3. Play guessing game in which blindfolded students guess what is being tapped based on the sound produced.

## **Assessment**

1. Grade the students' musical instruments from activity.
2. Play the sounds from different musical instruments and ask students to identify what makes the sound in each case.

3. Match each instrument to its name. Connect each pair with a line.

<p><b>Guitar</b></p>	
<p><b>Piano</b></p>	
<p><b>Tambourine</b></p>	
<p><b>Trumpet</b></p>	
<p><b>Maracas</b></p>	
<p><b>Drum</b></p>	
<p><b>Harmonica</b></p>	

# Ecosystems

## Module 2

### Grades 3 - 4

## **GRADES 3-4**

### **GENERAL OBJECTIVES**

The students should be able to:

1. Recognize that plants and animals depend on each other for their survival ,and become aware of feeding relationships among animals.
2. Recognize the importance of conservation of the resources in the environment and apply conservation methods.
3. Appreciate and explain the concept of the ecosystem.
4. Investigate and describe the ecosystem of the local and regional environment .
5. Understand the impact of natural disasters and human activities on the balance of the environment/ecosystem.

### **SPECIFIC OBJECTIVES:**

The students should be able:

1. Construct simple food webs to show feeding relationships among animals in a given area (a tree and places close to it; a flower garden; a pond; etc.).
2. Interpret simple food webs.
3. Infer that food webs help to keep nature in balance.
4. Identify factors that may disrupt the balance of nature.
5. State the consequences of disrupting the balance of nature.
6. Investigate the characteristics of mangrove swamps, rainforests, ponds, etc.
7. Explain the importance of mangrove swamps, rainforests and ponds.
8. Construct a model of an environment (habitat).
9. Explain the links between landform and type of ecosystems.
10. Discuss how ecosystems contribute to social and economic development (- e.g. fish, ecotourism, etc).

11. Name the different types of ecosystems found in your country and indicate their location on a map.
12. Investigate the characteristics and importance of ecosystems in the OECS/Caribbean region (other than own country).
13. Name the main types of Caribbean ecosystems.
14. Identify the countries in which specific ecosystems are located.
15. Indicate the distribution/location of some regional ecosystems (*hilly/wet/rainforest*) on a map of given countries.
16. Explain how ecosystems provide useful resources.
17. Define conservation.
18. Understand the concept of balance in the environment.
19. Describe the role of recycling and other conservation methods in maintaining balance in environment.
20. Identify local ecosystems (specifically coral reefs, mangrove swamps, rain forests) in need of conservation and the importance of conservation.
21. Identify and explain importance of other resources that need to be conserved/recycled.
22. Explain environmental conservation actions that can be taken in everyday life.
23. Appreciate that the environment needs to be protected.
24. Investigate conservation needs of your country (*focus on terrestrial*).
25. Identify ways of conserving the environment.
26. Identify ways in which humans interact with the environment.
27. Investigate the effect of wave action on the environment (*e.g. beach, coral reefs*).

**LEVELS OF ATTITUDES, SKILLS & TECHNOLOGY EXPECTED AT  
GRADES 3 - 4**

**ATTITUDES:**

**Students should be encouraged to:**

<b>Curiosity:</b>	<ul style="list-style-type: none"> <li>✓ Ask questions about objects and events.</li> <li>✓ Find out more about events and objects on their own.</li> </ul>
<b>Inventiveness:</b>	<ul style="list-style-type: none"> <li>✓ Suggest new ways of doing things.</li> <li>✓ Use equipment in novel ways.</li> </ul>
<b>Respect For Evidence</b>	<ul style="list-style-type: none"> <li>✓ Explain their results and conclusions using some evidence.</li> <li>✓ Listen to other students' results and explanations.</li> <li>✓ Begin to recognize when conclusions do not fit the evidence.</li> </ul>
<b>Persistence</b>	<ul style="list-style-type: none"> <li>✓ Complete activities.</li> <li>✓ Persist at tasks.</li> </ul>
<b>Respect For Living Things</b>	<ul style="list-style-type: none"> <li>✓ Show sensitivity to living things.</li> </ul>
<b>Cooperation</b>	<ul style="list-style-type: none"> <li>✓ Share with others.</li> <li>✓ Work together with others.</li> <li>✓ Accept responsibilities.</li> </ul>
<b>Concern For Safety</b>	<ul style="list-style-type: none"> <li>✓ Observe safety instructions.</li> </ul>

## SKILLS

<b>SKILLS:</b>	<b>In developing their skills of inquiry, problem solving and design, the students are expected to:</b>
<b>Observing</b>	<ul style="list-style-type: none"> <li>✓ Use as many senses as are appropriate and safe to gather information.</li> <li>✓ Identify differences and similarities between objects and events.</li> <li>✓ Identify sequence in events.</li> </ul>
<b>Measuring</b>	<ul style="list-style-type: none"> <li>✓ Use simple measuring instruments or models of measuring instruments. At first use comparative terms such as bigger, smaller and later use actual figures.</li> </ul>
<b>Manipulating</b>	<ul style="list-style-type: none"> <li>✓ Set up simple experiments to compare results.</li> <li>✓ Manipulate simple equipment.</li> </ul>
<b>Recording</b>	<ul style="list-style-type: none"> <li>✓ Use pictures and charts to report results.</li> <li>✓ Fill out simple tables to report results.</li> </ul>
<b>Classifying</b>	<ul style="list-style-type: none"> <li>✓ Group objects according to several criteria.</li> </ul>
<b>Communicating</b>	<ul style="list-style-type: none"> <li>✓ Talk freely about their activities and the ideas they have, with or without making a written record.</li> <li>✓ Use appropriate vocabulary to describe their observations.</li> <li>✓ Listen to others' ideas and look at their results.</li> <li>✓ Report events by using demonstrations, role play, simple drawings, paintings and paragraphs.</li> <li>✓ Use bar graphs, pictures, tables and charts to report results.</li> <li>✓ Use books and other sources to find information.</li> </ul>



**SKILLS CONT'D**

<b>Inferring</b>	<ul style="list-style-type: none"> <li>✓ Notice patterns and relationships in simple measurements and events.</li> </ul>
<b>Interpreting data</b>	<ul style="list-style-type: none"> <li>✓ Discuss what they find out in response to questions.</li> <li>✓ Compare their findings with their predictions.</li> <li>✓ Notice changes when one variable is changed.</li> </ul>
<b>Experimenting</b>	<ul style="list-style-type: none"> <li>✓ Freely ask a variety of questions and suggest how they might be answered.</li> <li>✓ Suggest how they could investigate to find out answers to questions.</li> <li>✓ Have some idea of the variable that has to be changed or what different things are to be compared in an investigation.</li> <li>✓ Suggest equipment, materials and procedure for conducting investigations.</li> </ul>
<b>Predicting</b>	<ul style="list-style-type: none"> <li>✓ Attempt to use evidence in making predictions.</li> </ul>
<b>Hypothesizing</b>	<ul style="list-style-type: none"> <li>✓ Attempt to explain things that are consistent with evidence.</li> <li>✓ Suggest how something may have happened.</li> </ul>
<b>Problem Solving</b>	<ul style="list-style-type: none"> <li>✓ Suggest solutions to simple problems.</li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>✓ Construct models either by following instructions or by using their own designs.</li> <li>✓ Select appropriate material to make models and gadgets.</li> <li>✓ Formulate problems, do appropriate research, and devise solutions.</li> <li>✓ Select appropriate material to make models and gadgets.</li> <li>✓ Evaluate their own designs using simple criteria.</li> </ul>

## TECHNOLOGY

<p><b>Technological Methods</b></p>	<ul style="list-style-type: none"> <li>✓ Students will be able to formulate problems, do appropriate research and devise solutions (e.g. construct gadgets).</li> </ul>
<p><b>Nature Of Technology</b></p>	<ul style="list-style-type: none"> <li>✓ Look at past inventions in their historical context.</li> <li>✓ Understand that products are replicable.</li> <li>✓ Understand that others may be working on the same idea.</li> <li>✓ Realize that they can use scientific knowledge in doing technology and that technology helps to develop reliable scientific information.</li> <li>✓ Understand the importance of precision and safety in developing new products.</li> <li>✓ Understand that technology is novel and creative.</li> <li>✓ Understand that if the people in a country are creative and innovative, their country can progress.</li> <li>✓ Understand that people use processes involving living things (Biotechnology) and materials (Production Technology) to satisfy their needs.</li> </ul>
<p><b>Use Of Technology</b></p>	<ul style="list-style-type: none"> <li>✓ Appreciate the use of devices, tools and structures made by humans in the home and community.</li> <li>✓ Appreciate the advantages of using these products.</li> <li>✓ Realize that human-made things can pollute the environment.</li> <li>✓ Look at advantages and disadvantages to help them make decisions of what is the best technology that can be used in a particular situation.</li> <li>✓ Realize that people may abuse and misuse technology</li> <li>✓ Understand that technology may have unintended consequences.</li> </ul>

Unit: ecosystems (grade 3)

**Topic: Food Webs - Balancing Nature**

**Duration: 3 Lessons**

### **Specific Objectives**

Students should be able to:

1. Construct simple food webs to show feeding relationships among animals in a given area (a tree and places close to it; a flower garden; a pond; etc).
2. Interpret simple food webs.
3. Infer that food webs help to keep nature in balance.
4. Identify factors that may disrupt the balance of nature.
5. State the consequences of disrupting the balance of nature.

### **Process Skills**

Constructing, Observing, Recording, Inferring, Drawing,

### **Materials**

Pencil/crayons  
Drawing paper  
Chart (*food web/s*)  
Worksheets (*fill the blanks*)

### **Content summary**

A **food web** is a number of food chains that are interlinked. It represents feeding patterns of organisms within an ecosystem. Because there is **competition** for food, it is possible for the **balance** in the ecosystem to be disrupted if any of the organisms is interfered with (natural disasters floods, hurricanes, volcanic eruptions, etc.; human activities, deforestation, hunting, etc.).

## **Suggested Activities**

1. Study diagram(s) of simple food web(s) and identify the feeding relationships of animals. Indicate where there is competition.
2. Tabulate the findings of feeding relationships (producers, herbivores, etc.).
3. Visit a local area and record the names of organisms found there. Go back to the classroom and work in groups to construct a food web for the area.
4. Construct food webs to show the feeding relationships for a list of organisms found in an area (garden, pond, etc.).

## **Assessment**

1. Students will analyze food web and answer 'True/False' questions on the feeding habits of organisms within it.
2. Grade food webs that are produced in groups/individuals.
3. Students will complete worksheet by filling the blank spaces for statements relevant to the topic.

## **Topic: Conservation**

### **Duration: 4 Lessons**

### **Specific Objectives**

Students should be able to:

1. Define conservation.
2. Understand the concept of balance in the environment.
3. Describe the role of recycling and conservation in maintaining balance in the environment.
4. Identify local ecosystems (specifically coral reefs, mangrove swamps, rain forests) in need of conservation and the importance of conservation.
5. Identify and explain the importance of other resources that need to be conserved/recycled.
6. Explain environmental conservation actions that can be taken in everyday life.

### **Process Skills**

Observing, Communicating, Predicting, Manipulating, Creating.

### **Materials**

Water

Juice

Marbles

Word search

Pictures

Charts

Materials to be recycled: Glue

Paper

Empty cans

Candy sticks

Candy wrappers Cardboard rolls for toilet paper/paper towels

## Content summary

**Conservation** is the careful use of our **natural resources**. It is imperative for the balance in nature to be maintained; conserving what we have is one of the ways in which we may help to maintain the balance. Methods of conservation include **recycling**, **reducing** and **reusing** resources whenever possible.

## Suggested Activities

1. Students each will have a glass of water/juice from one jug, or each takes a marble from a bag. Observe what happens if this action is not balanced by replenishing the water and marbles. Predict what will happen in other scenarios in the environment if resources are over-used.
2. Discuss meaning of conservation and recycling and their role in maintaining balance in the environment.
3. Go on field trips to a mangrove swamp, rainforest and/or coral reef (via glass bottom boat) and observe the surroundings. Discuss importance of each of these ecosystems.
4. Review need for conservation and recycling other items in environment, such as water, trees, sandy beaches, etc.
5. Listen to presentation by resource person who is involved in conservation work and ask questions as necessary.
6. Identify ways in which people do or can conserve, and actions that do not help conservation.
7. Create and implement a plan to conserve or recycle a resource at school or in community, e.g. posters to educate, tree planting/care, etc.
8. Make useful items from recycled materials, e.g. pen & pencil holder from paper and popsicle sticks.

## Assessment

1. Let students write down what they understand by (i.) balance and (ii.) conservation.
2. Prepare word search and have students find as many words as possible related to the topic.

3. Identify an ecosystem discussed in class and explain in writing why and how it should be conserved.
4. Group work: choose a resource, habitat/ecosystem, species, etc. that should be conserved and illustrate best and worst practices.
5. Students' (peer/individual) assessment of projects and activities.
6. Students suggest measures that could be taken to conserve specified ecosystems (mangrove swamps, rainforest, ponds, etc.).

Unit: ecosystems (grade 4)

**Topic: Ecosystems (Local)**

**Duration: 4 Lessons**

**Specific Objectives**

Students should be able to:

1. Investigate the characteristics of mangrove swamps, rainforests, ponds, etc.
2. Explain the importance of mangrove swamps, rainforests and ponds.
3. Construct a model of an environment (habitat).

**Process Skills**

Observing, Investigating, Communicating, Constructing

**Materials**

Play dough/plasticine  
Cardboard

**Content summary**

There are various ecosystems in your country. They may include, river/pond, mangrove, rain forests. The existing ecosystems of a country have important resources that people depend on for food, clothing and other things.

**Suggested Activities**

1. Go on field trip to see different ecosystems (mangrove, rainforest, pond). Record findings on a given worksheet.
2. Discuss the importance of these ecosystems (to animals, humans, the economy, etc.).
3. Build or paint a mangrove model/mural in groups. (You may choose another ecosystem.)



## **Assessment**

1. Completed worksheet of field trip discoveries.
2. Grade model/mural.
3. Write a poem that tells the importance of a specified ecosystem.

## **Topic: Local and Regional Ecosystems: Distribution and Location**

### **Duration: 4 Lessons**

### **Specific Objectives**

Students should be able to:

1. Explain the links between landform and type of ecosystems.
2. Discuss how ecosystems contribute to social and economic development (-e.g. fish, ecotourism, etc.
3. Name the different types of ecosystems found in your country and indicate their location on a map.
4. Investigate the characteristics and importance of ecosystems in the OECS/Caribbean region (other than own country).
5. Name the main types of Caribbean ecosystems.
6. Identify the countries in which specific ecosystems are located.
7. Indicate the Distribution/location of some regional ecosystems (*hilly/wet/rainforest*) on a map of given countries.
8. Explain how ecosystems provide useful resources.

### **Process Skills**

Observing, Inferring, Manipulating, Communicating, Investigating, Reporting.

### **Materials**

Relief map (*your island/country*)  
Charts (*different types of ecosystems*)  
Crayons/pencils  
Video (*documentary on Caribbean ecosystems*)  
Map/maps of Caribbean territories

## Content summary

The **distribution** and **location** of **local** and **regional ecosystems** are many and varied. They include **rainforests**, **wetlands** and **hilly/mountainous** areas. The existence of ecosystems benefits our countries in a number of ways, such as for **recreation**, **food** and **tourist attractions**.

## Suggested Activities

1. Go on island tour to investigate different types of ecosystems on the island. Take note of their distribution.
2. Engage in follow-up discussion of the following:
  - a. types and location of ecosystems
  - b. links between landforms and ecosystems
  - c. the importance of ecosystems to development.
3. Identify the location of different types of ecosystems displayed on a map.
4. View documentary video showing ecosystems found in various countries.

## Assessment

1. Indicate the location of different types of ecosystems on an outline map, using a specified set of legends. (keys)
2. Make models to/represent/simulate named ecosystems.
3. Develop chart/table indicating the existence of different ecosystems by country.
4. Make oral/written presentation on the benefits of ecosystems to different countries.

## Topic: Environmental Destruction

Duration: 3 Lessonss

### Specific Objectives

Students should be able to:

1. Identify ways in which humans interact with the environment.
2. Investigate the effect of wave action on the environment (*e.g. beach, coral reefs.*)

### Materials

Pictures/videos (*coastal features*)  
Worksheets (*Puzzle*)

### Content summary

Environmental destruction is the upsetting of the balance of nature. The balance in nature can be destroyed by **natural processes**, such as **hurricanes, earthquakes, volcanic eruptions, droughts and floods**. The balance may also be disturbed by activities of humans. **Pollution** of air and water resources, **deforestation** and **excavations** of portions of the earth are some of the ways in which human, destroy the environment.

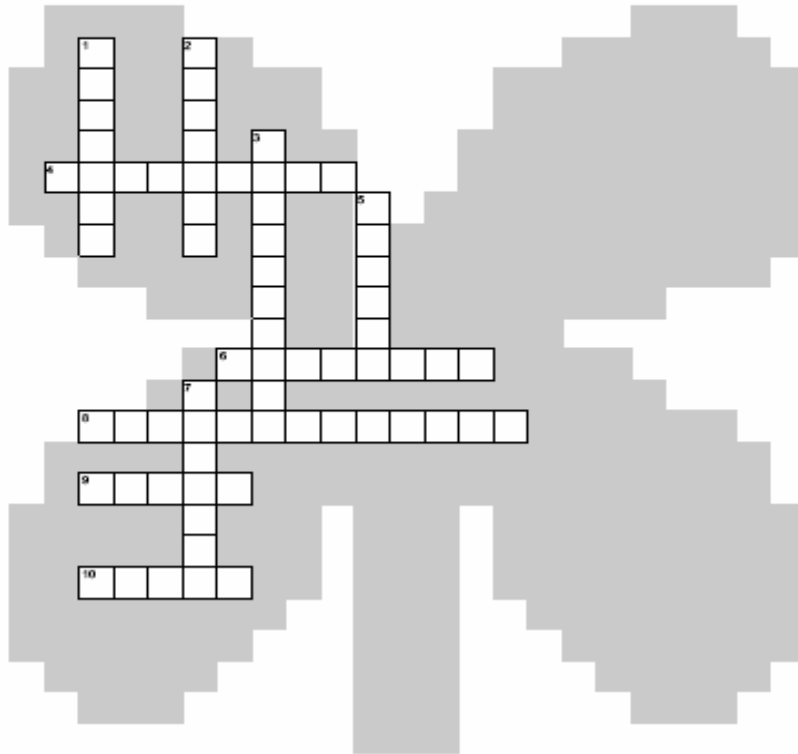
### Suggested Activities

1. Observe the immediate environment and identify areas that have been destroyed. Discuss how people activities contributed to the destruction.
2. Go on field trip to coastal area (beach, mangrove swamp, etc.). Observe the environment: litter, erosion, depletion of sand, etc.
3. Write a report on the destruction caused to the environment by humans. Suggest ways in which humans may prevent destruction of the environment.
4. Examine picture/view documentary of coastal features formed by waves.

## **Assessment**

1. Graded reports (after field trips).
2. Design posters to be used in a campaign against environmental destruction by man.
3. Worksheet: match key concepts to their meaning (use a puzzle).

### Environmental Destruction



#### Down

1. to make unclean
2. the wearing away of top-soil
3. violent shaking of the earth
5. garbage or rubbish not properly discarded
7. a place where magma can escape from inside the earth

#### Across

4. severe storm with very strong wind
6. vegetation found in the swampy areas near sea
8. removing or destroying many trees
9. where the sea meets the shore
10. large amount of water flowing over land

## Topic: Conservation Needs (Your country)

Duration: 3 Lessons

### Specific Objectives

Students should be able to:

1. Appreciate that the environment needs to be protected.
2. Investigate conservation needs of countries (*focus on terrestrial*).
3. Identify ways of conserving the environment.

### Process skills

Communicating, Creating, Experimenting, Manipulating, Constructing, Communicating

### Materials

Plants/trees

Vegetable peelings (*for compost*)

Plot of fenced land (*to build compost*)

Resource person (*from environment/solid waste management department*)

Soil in shallow container (*for soil erosion experiment*)

Water

Watering can (*to simulate rain*)

### Content Summary

The wise use of our **natural resources** is called **conservation**. It is important to practise conservation of our resources in order to save the environment. Conservation methods include **reducing** waste, **recycling** and **reusing** resources as far as possible. Practising conservation can bring positive results to the environment. One method of reducing waste, while at the same time recycling useful materials, is **composting**. **Compost** is a soil conditioner and fertilizer, and is the product of the decomposition of animal and plant matter. It is used by gardeners to replenish the humus in soil.

## **Suggested Activities**

Students will do the following:

1. Hold discussion with resource person from the solid waste management authority in the area. Write a report on what they have learnt about managing solid waste.
2. Build/construct a compost heap.
3. Art project: Use old and discarded items to create a useful artefact.
4. Write a petition to your parliamentary representative, requesting protection for the terrestrial environment.
5. Tree planting exercise.
6. Write a poem/song about the importance of terrestrial conservation.
7. Carry out an experiment to demonstrate soil erosion.
8. Carry out a clean-up campaign.

## **Assessment**

1. Teacher-made Test
2. Letter/poem/projects
3. Grade reports on solid waste management.



# Ecosystems

## Module 3

### Grades 5 – 6

## **GRADES 5 – 6**

### **GENERAL OBJECTIVES**

The students should be able to:

1. Recognize the complexity of feeding relationships among animals and be able to describe and represent them in some way.
2. Recognize that a change in an ecosystem can affect life.
3. Develop responsibility for the protection of the environment.
4. Understand the impact of natural disasters and people's activities on the balance of the environment/ecosystem.

### **SPECIFIC OBJECTIVES**

The students should be able to:

1. Give examples of interactions among biotic factors in an ecosystem.
2. Identify species in a food web as herbivores and, carnivores and also producers and consumers.
3. Explain that living things compete for food and space in the environment.
4. Identify animals competing for food in a food web.
5. Identify food chains and food webs in an ecosystem.
6. Explain competition among living organisms in an environment.
7. Define (i.) Species (ii.) population (iii.) overpopulation (iv.) birth rate (v.) death rate.
8. List some factors that can affect population growth.
9. Identify the impact of underpopulation/overpopulation of organisms on their habitat.
10. Collect data on the number of specific organisms within a habitat.

11. Estimate the population of a given organism in a small area/habitat.
12. Identify natural water sources.
13. State ways in which water may be polluted.
14. Identify marine pollutants.
15. Suggest ways of preventing/reducing marine pollution.
16. Compare the degree of air pollution in two different areas.
17. Hypothesize about the reason for the differences in (16).
18. Investigate the cause(s) of air pollution in the two areas (in 16 and 17) to test hypotheses).
19. Design and construct a device to detect air pollution.
20. Discuss the importance of having clean air.
21. Discuss how people's activities may result in air and water pollution.
22. Construct a device to determine the turbidity of water.
23. Arrange water samples according to their degrees of turbidity.
24. Define surface tension.
25. State how surface tension can be broken.
26. Identify and describe the effect of soap on the movement of water through cloth and paper.
27. Plan and design an experiment to make polluted water clean.
28. Discuss ways of reducing air and water pollution.
29. Design and make brochures, posters, etc. on conservation of air and water.
30. Describe the immediate environment.
31. Identify some ways in which an ecosystem can change.
32. Examine and describe a local ecosystem that has experienced change.

33. List factors that can bring about changes to ecosystems.
34. Investigate the impact humans have on ecosystems.
35. Recognize the role that humans play in protecting or destroying ecosystems.
36. Demonstrate involvement in environmental protection.
37. Appreciate the fragile nature of ecosystems.
38. Describe an earthquake as a natural process and state what causes it.
39. Identify ways in which earthquakes have an impact on the environment.
40. State the safety measures to be carried out during an earthquake and demonstrate each measure.
41. Identify volcanic activity as a natural process in the environment.
42. Explain how volcanoes are formed.
43. Discuss the impact of volcanic eruptions on the ecosystem.
44. List useful and harmful effects of the presence of a volcano in an environment.

**LEVELS OF ATTITUDES, SKILLS & TECHNOLOGY EXPECTED AT GRADES 5 - 6**

**ATTITUDES:**

**Students should be encouraged to:**

<b>Curiosity:</b>	<ul style="list-style-type: none"> <li>✓ Ask questions about objects and events.</li> <li>✓ Find out more about events and objects on their own.</li> </ul>
<b>Inventiveness:</b>	<ul style="list-style-type: none"> <li>✓ Suggest new ways of doing things.</li> <li>✓ Use equipment in novel ways.</li> </ul>
<b>Respect For Evidence</b>	<ul style="list-style-type: none"> <li>✓ Use evidence to justify their conclusions.</li> <li>✓ Listen to other students' results and explanations.</li> <li>✓ Recognize when conclusions do not fit the evidence.</li> <li>✓ Change their ideas in response to evidence.</li> <li>✓ Point out contradictions in reports by their classmates.</li> <li>✓ Show a willingness to review procedures and evaluate their work.</li> </ul>
<b>Persistence</b>	<ul style="list-style-type: none"> <li>✓ Complete activities.</li> <li>✓ Persist at tasks.</li> <li>✓ Repeat experiments when previous attempts have failed.</li> </ul>
<b>Respect For Living Things</b>	<ul style="list-style-type: none"> <li>✓ Show sensitivity to living things.</li> </ul>
<b>Cooperation</b>	<ul style="list-style-type: none"> <li>✓ Share with others.</li> <li>✓ Work together with others.</li> <li>✓ Accept responsibilities.</li> </ul>
<b>Concern For Safety</b>	<ul style="list-style-type: none"> <li>✓ Observe safety instructions.</li> </ul>

<b>SKILLS:</b>	
<b>In developing their skills of inquiry, problem solving and design the students are expected to:</b>	
<b>Observing</b>	<ul style="list-style-type: none"> <li>✓ Use as many senses as are appropriate and safe to gather information.</li> <li>✓ Identify differences and similarities between objects and events.</li> <li>✓ Identify sequence in events.</li> <li>✓ Distinguish from many observations those that are relevant to an investigation.</li> </ul>
<b>Measuring</b>	<ul style="list-style-type: none"> <li>✓ Use simple measuring instruments or models of measuring instruments.</li> <li>✓ Use units in measurement.</li> </ul>
<b>Manipulating</b>	<ul style="list-style-type: none"> <li>✓ Set up simple experiments to compare results.</li> <li>✓ Manipulate simple equipment.</li> </ul>
<b>Recording</b>	<ul style="list-style-type: none"> <li>✓ Use pictures and charts to report results.</li> <li>✓ Fill out simple tables to report results.</li> </ul>
<b>Classifying</b>	<ul style="list-style-type: none"> <li>✓ Group objects according to several criteria.</li> </ul>
<b>Communicating</b>	<ul style="list-style-type: none"> <li>✓ Talk freely about their activities and the ideas they have, with or without making a written record.</li> <li>✓ Use appropriate vocabulary to describe their observations.</li> <li>✓ Listen to others' ideas and look at their results.</li> <li>✓ Write reports on their investigations.</li> <li>✓ Use bar graphs, pictures, tables and charts to report results.</li> <li>✓ Regularly and spontaneously use books and other sources to check or supplement investigations.</li> <li>✓ Select appropriate methods to report events. Include drawings, reports and multi-media.</li> </ul>

## SKILLS CONT'D

<b>Inferring</b>	<ul style="list-style-type: none"> <li>✓ Notice patterns in data.</li> <li>✓ Draw reasonable conclusions from data.</li> </ul>
<b>Interpreting data</b>	<ul style="list-style-type: none"> <li>✓ Discuss what they find out in response to questions.</li> <li>✓ Compare their findings with their predictions.</li> <li>✓ Make associations with change in variables and results.</li> </ul>
<b>Experimenting</b>	<ul style="list-style-type: none"> <li>✓ Freely ask a variety of questions and suggest how they might be answered.</li> <li>✓ Formulate problems to be investigated.</li> <li>✓ Suggest how they could investigate to find out answers to questions.</li> <li>✓ Plan to conduct investigations. Select equipment, materials and procedures for conducting investigations.</li> <li>✓ Understand what is a fair test.</li> <li>✓ Keep appropriate variables constant and vary the independent variable in experiments.</li> </ul>
<b>Predicting</b>	<ul style="list-style-type: none"> <li>✓ Use evidence in making predictions.</li> <li>✓ Show how they have used evidence in making predictions.</li> </ul>
<b>Hypothesizing</b>	<ul style="list-style-type: none"> <li>✓ Attempt to explain things that are consistent with evidence.</li> <li>✓ Suggest how something may have happened.</li> </ul>
<b>Problem Solving</b>	<ul style="list-style-type: none"> <li>✓ Suggest solutions to simple problems.</li> <li>✓ Identify needs, formulate questions, conduct research and design solutions to problems.</li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>✓ Construct models either by following instructions or by using their own designs.</li> <li>✓ Select appropriate material to make models and gadgets.</li> <li>✓ Formulate problems, do appropriate research, and devise solutions.</li> <li>✓ Select appropriate material to make models and gadgets.</li> <li>✓ Evaluate their own designs and the designs of others using simple criteria.</li> </ul>

## TECHNOLOGY

<p><b><u>Technological Methods</u></b></p>	<ul style="list-style-type: none"> <li>✓ Students will be able to formulate problems, do appropriate research and devise solutions (e.g. construct gadgets).</li> </ul>
<p><b>Nature Of Technology</b></p>	<ul style="list-style-type: none"> <li>✓ Look at past inventions in their historical context.</li> <li>✓ Understand that products are replicable.</li> <li>✓ Understand that others may be working on the same idea.</li> <li>✓ Realize that they can use scientific knowledge in doing technology and that technology helps to develop reliable scientific information.</li> <li>✓ Understand the importance of precision and safety in developing new products.</li> <li>✓ Understand that technology is novel and creative.</li> <li>✓ Understand that if the people in a country are creative and innovative, their country can progress.</li> <li>✓ Understand that people use processes involving living things (Biotechnology) and materials (Production Technology) to satisfy their needs.</li> </ul>
<p><b><u>Use Of Technology</u></b></p>	<ul style="list-style-type: none"> <li>✓ Appreciate the use of devices, tools and structures made by humans in the home and community.</li> <li>✓ Appreciate the advantages of using these products.</li> <li>✓ Realize that human-made things can pollute the environment.</li> <li>✓ Look at advantages and disadvantages to help them make decisions of what is the best technology that can be used in a particular situation.</li> <li>✓ Realize that people may abuse and misuse technology.</li> </ul>



## Unit: ecosystems (grade 5)

### Topic: Food Webs

### Duration: 4 Lessons

### Specific Objectives

Students should be able to:

1. Construct simple food chains and food webs.
2. Identify species in a food web as herbivores, carnivores and also as producers and consumers.
3. Identify animals competing for food in a food web.
4. Explain that living things compete for food and space in the environment.

### Process Skills

Observing, Communicating, Interpreting, Classification

### Materials

Pictures (*animals in their environment*)

Worksheets (*illustrations of food webs*)

### Content Summary

The feeding relationships among organisms in an environment may be represented by simple **food chains** or more complex **food webs**.

## Suggested Activities

1. Observe animals in their environment/habitat and discuss observations.
2. Construct food chains and food webs to represent the interactions that were discussed.
3. Identify the producers and consumers in the food webs.
4. Analyze a food web and make predictions about outcomes, if there is a breakdown at any stage in the food web.
5. The diagrams on the previous page are two examples of food webs.
  - (a) In each food web identify the producers and consumers.
  - (b) Suggest what would happen to the organisms in the food web if all the insect larvae died out.
  - (c) Make a list of all the animals found in your garden or the school grounds. Construct a food web to show their feeding relationships.

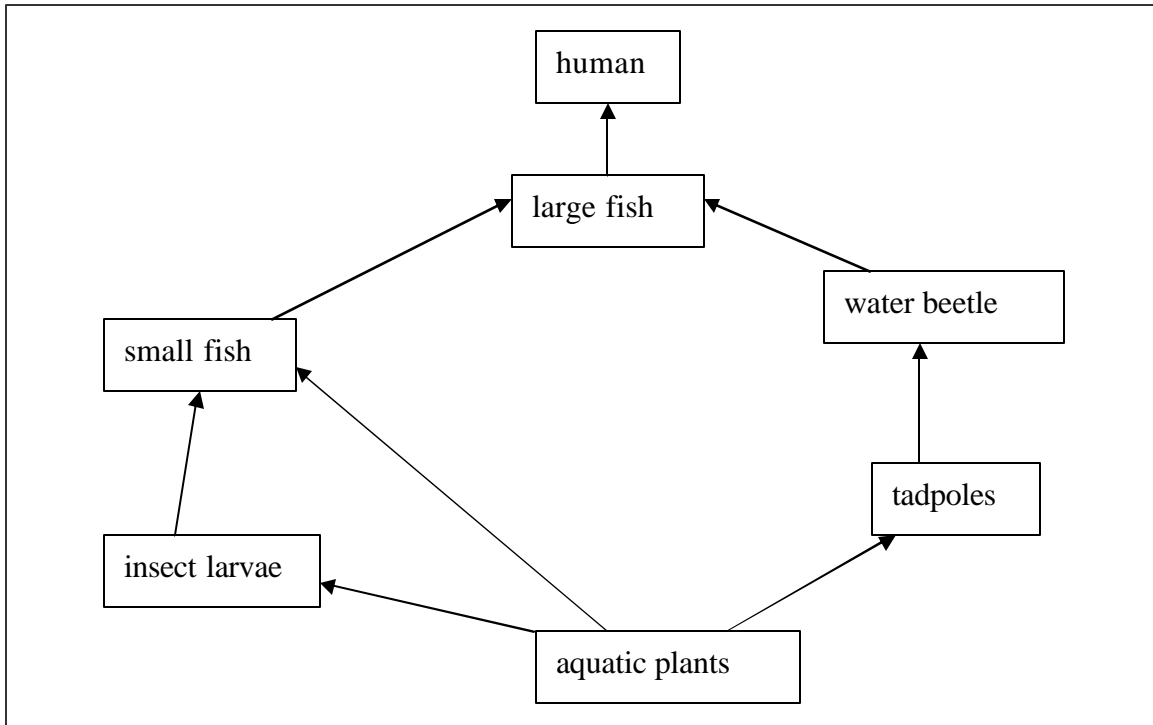
*Adapted from Commissiong, et al, p 123*

6. Collect pictures of various consumers. Classify them and give examples of foods that each consumer eats.

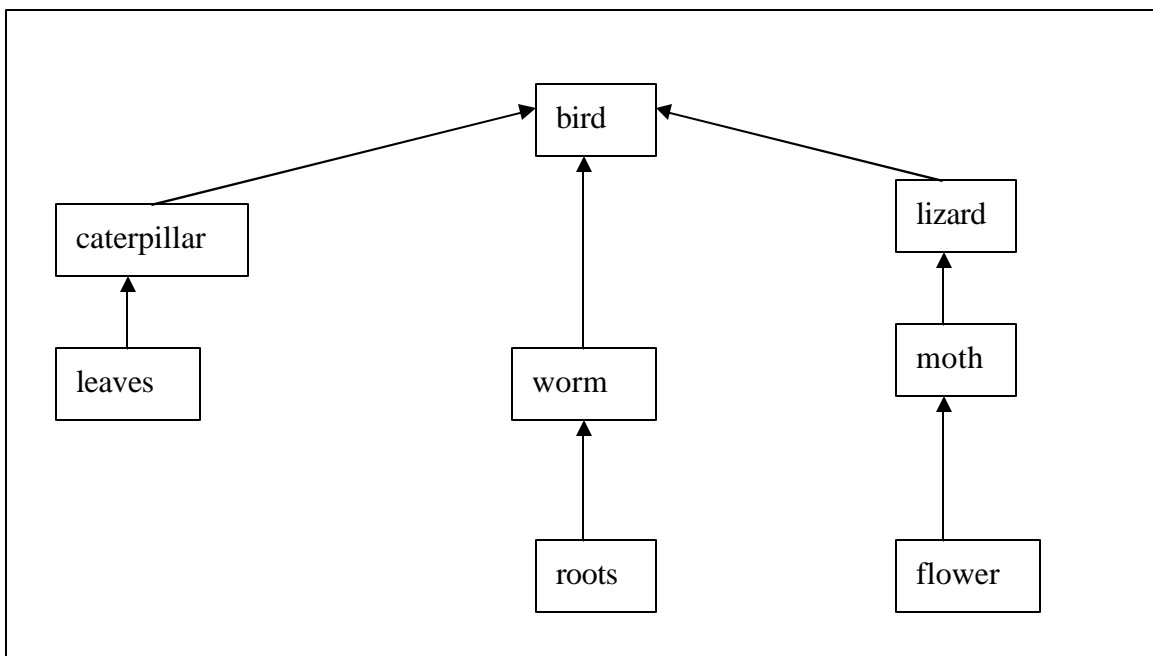
## Assessment

1. Oral questions
2. Construct food chains/webs using a given list of organisms.
3. Work sheets (complete food webs)
4. Written exercises
5. Graded projects

Grade 5: **Food Webs** – for Suggested Activities nos. 3 and 4



Fresh water food web



Garden (terrestrial) food web

## Topic: Population

### Duration: 4 Lessons

### Specific Objectives

Students should be able to:

1. Define (i.) Species (ii.) population (iii.) overpopulation (iv.) birth rate (v.) death rate.
2. List some factors that can affect population growth.
3. Identify the impact of underpopulation/overpopulation of organisms on their habitat.
4. Collect data on the number of specific organisms within a habitat.
5. Estimate the population of a given organism in a small area/habitat.

### Process Skills

Observing, Data-collecting, Analyzing, Communicating, Classifying, Manipulating, Recording, Interpreting.

### Materials

Text/CD-ROM/Website (to research population)

### Content Summary

The number of plants or animals of a particular species in a given habitat is the **population** of that species. The term is used in the same way that it is used when referring to the number of people living in a town or village.

Among the factors that can affect the population of plants and animals are: **birth/death rates, food supply, predator-prey** relationships and **environmental influences** such as natural disasters.

If any given organism **overpopulates** an area, then maintaining nature's balance becomes a problem.

## **Suggested Activities**

1. Discuss what population is and factors that can affect it.
2. Estimate the population of a named organism (grass, ladybugs, butterflies, etc.) in a given habitat such as the schoolyard or the student's backyard.

## **Assessment**

1. Answer these questions.
  - a) Give the meaning of: (i.) species (ii.) population (iii.) overpopulation
  - b) List three factors that can change the population of an organism within a habitat.
2. Presentation of data collected (tables/graphs).

## **Topic: Natural Water Resources**

### **Duration: 2 Lessons**

### **Specific Objectives**

Students should be able to:

1. Identify natural water sources.
2. Define surface tension.
3. State how surface tension can be broken.
4. Identify and describe the effect of soap on the movement of water through cloth and paper.

### **Process Skills**

Communicating, Observing, Classifying, Manipulating, Inferring

### **Materials**

Soapy water  
Salty water  
Distilled water  
Rain water  
Tap water  
Droppers  
Needle  
Jars  
Cloth  
Paper

### **Content Summary**

**Water** is a very valuable natural **resource** found on earth. Natural sources of water include rain, springs, rivers, lakes and the ocean. The properties of water vary when different things are added to it.

## **Suggested Activities**

1. Identify the places from where we obtain water.
2. Discuss how a mosquito is able to 'sit' on the surface of water (use a picture to stimulate discussion).
3. Observe a demonstration of surface tension being destroyed.
4. Experiment with fresh and soapy water to compare the rate of movement of water through (i) paper (ii) cloth

## **Assessment**

1. Teacher-made test
2. Graded report

## Topic: Using and Conserving Resources

### Duration: 4 Lessons

### Specific Objectives

Students should be able to:

1. Identify marine pollutants.
2. Suggest ways of preventing/reducing marine pollution.
3. Investigate the impact humans have on ecosystems.
4. Recognize the role that humans play in protecting or destroying ecosystems.
5. Demonstrate involvement in environmental protection.

### Process Skills

Observing, Communicating, Interpreting

### Materials

Video (*documentary on marine pollution and conservation*)

Pictures (*destroyed ecosystems*)

Manila

Markers

Resource person

### Content Summary

**Pollution** of air and water resources, **deforestation** and **excavations** of portions of the earth are some of the ways in which humans destroy the balance of nature.

The prudent use of our **natural resources** is called **conservation**. Conservation methods include **reducing** waste, **recycling** and **reusing** resources as far as possible. Additionally, **littering** should be avoided. Practising conservation can bring positive results to the environment.



## **Suggested Activities**

Pupils will do the following:

1. Go on field trips to observe the environment around them.
2. Look at pictures of destruction to the ecosystem.
3. Engage in discussion with resource person about care of the environment.
4. View documentary on destruction and conservation of marine life.
5. Work in groups to identify ways in which they can help to protect the environment.
6. Draft possible laws that may be enforced to help in protecting the country's ecosystems.
7. Make a flow chart to illustrate how one change in an ecosystem can lead to further changes in that ecosystem.

## **Assessment**

1. Oral questions based on field trip(s).
2. Students write a summary of the marine conservation documentary.
3. Students design a poster to help sensitize the public on how to protect the environment.
4. Teacher Grades flow-charts made by students

## Topic: Volcanoes

### Duration: 2 Lessons

### Specific Objectives

Students should be able to:

1. Identify volcanic activity as a natural process in the environment.
2. Explain how volcanoes are formed.
3. Discuss the impact of volcanic eruptions on the ecosystem.
4. List useful and harmful effects of the presence of a volcano in an environment.

### Process Skills

Observing, Communicating, Inferring, Predicting.

### Materials

Video (*documentary on volcanoes*)

Clay/play dough

Antacid (e.g. Eno)

Worksheets (*pros and cons of volcanic eruption*)

### Content Summary

Natural processes can affect the balance in nature. One such natural process is a **volcanic eruption**. A **Volcano** forms when there is a fault in the earth's crust. Since the temperature inside the earth is very high, the rocks there are molten and under very high pressure. Any weakness in the earth's crust allows **magma** (molten rocks) to be forced out of the earth. This ejection constitutes a volcanic eruption. Such eruptions have a great impact on the environment.

## **Suggested Activities**

1. View video documentary on volcanoes.
2. Build a working model of a volcano.
3. Look at picture showing erupting volcano and/or aftermath; discuss the impact that eruptions have on the environment.

## **Assessment**

1. Grade model of volcano .
2. Complete work sheets.

Unit: ecosystems (grade 6)

**Topic: Feeding Relationships**

**Duration: 4 Lessons**

**Specific Objectives**

Students should be able to:

1. Give examples of interactions among biotic factors in an ecosystem.
2. Identify food chains and food webs in an ecosystem
3. Explain competition among living organisms in an environment.

**Process Skills**

Observing, Investigating, Classifying Manipulating, Interpreting, Recording.

**Materials**

Nets

Hand lenses

Aquaria/fish bowls

Pond water with organisms (fish, snails, pond-weed, etc).

**Content Summary**

In some feeding relationships, both organisms benefit; this is called **symbiosis**. There are some relationships where only one organism benefits; this is **commensalism**. In the feeding relationship called **parasitism**, the animal that is fed on is called the **host** while the organism that feeds is called a **parasite**. The parasite has a negative effect on the host and can make it sick.

## **Suggested Activities**

1. Examine pictures of birds riding on the backs of cattle. Discuss the reason for this.
2. Discuss the relationships between dogs and fleas.
3. Look at pictures of different ecosystems (e. g. ponds, swamps, flower garden, etc.). List the organisms that live in each ecosystem and construct food chains and food webs based on the information.
4. Examine food webs to identify producers, consumers, predators and prey. Discuss how the organisms compete for food.
5. Set up ecosystems in the classroom (aquaria; 'pour-a-pond'). Use hand lenses to examine the organisms in these ecosystems.
6. Observe and record changes in the population of organisms in the (classroom) ecosystems over a period of a few weeks. Write a report on the findings.

## **Assessment**

1. Teacher-made test/quiz.
2. Group project: simulate an ecosystem.
3. Integrate given food chains to create food webs.
4. Grade reports.

## **Topic: Our Changing Environment**

**Duration: 4 Lessons**

### **Specific Objectives**

Students should be able to:

1. Describe the immediate environment.
2. Identify some ways in which an ecosystem can change.
3. Examine and describe a local ecosystem that has experienced change.
4. Appreciate the fragile nature of ecosystems.
5. List factors that can bring about changes to ecosystems.

### **Process Skills**

Observing, Investigating, Reporting, Communicating

### **Materials**

Pictures/video  
Cardboard  
Empty cans  
Empty bottles  
Tape

### **Content Summary**

The balance in nature can be affected by **natural processes** such as **hurricanes, earthquakes, volcanic eruptions, droughts and floods**, and also by activities of humans. **Pollution** of air and water resources, **deforestation** and **excavations** of portions of the earth are some of the ways in which humans destroy the balance of nature.

## **Suggested Activities**

1. View pictures, taken at an earlier period, of a well-known area (neighbourhood, popular beach, etc.). Discuss how this area has changed.
2. Identify the changes in the area and suggest how they may have come about.
3. Discuss ways in which named natural processes/disasters have an impact on an ecosystem to change it (earthquakes, hurricanes, etc.).
4. Investigate the contribution of human activities to the changes in a given local ecosystem and write a report on it (highlight its original state, effects of technology, and so on).

## **Assessment**

1. Construct model ecosystems, depicting before-and-after major changes brought on by natural disasters and/or human activities.
2. Make a collage of before-and-after pictures, illustrating major changes in a local ecosystem.
3. Prepare a graded report on 'Impact of Human Activities' on a named ecosystem.
4. Write a description/make a presentation of how life can be affected by changes in an ecosystem.

## **Topic: Conservation**

### **Duration: 4 Lessons**

### **Specific Objectives**

Students should be able to:

1. Compare the degree of air pollution in two different areas.
2. Hypothesize about the reason for the differences.
3. Investigate the cause(s) of air pollution in the two areas (to test hypotheses).
4. Design and construct a device to detect air pollution.
5. Discuss the importance of having clean air.
6. Identify natural sources of water.
7. State ways in which water may be polluted.
8. Discuss how people's activities may result in air and water pollution.
9. Construct a device to determine the turbidity of water.
10. Arrange water samples according to their degrees of turbidity.
11. Plan and design an experiment to make polluted water clean.
12. Discuss ways of reducing air and water pollution.
13. Design and make brochures, posters, etc. on conservation of air and water.

### **Process Skills**

Observing, Manipulating, Designing, Communicating, Hypothesizing,  
Planning, Experimenting.



## Materials

Video  
Pictures  
Markers  
Manila  
Water samples

## Content Summary

**Pollution** of air and water sources is one way in which humans destroy the balance of nature.

The wise use of our **natural resources** is called **conservation**. Conservation methods include **reducing** waste, **recycling/reusing** resources as far as possible, and avoiding littering. Practising conservation can bring positive results to the environment.

## Suggested Activities

1. Visit various areas to investigate the amount of air pollution found in each area. Discuss reasons for any differences discovered.
2. Design and make a device for detecting air pollution.
3. List natural sources of water.
4. View a video documentary on polluted water sources. Discuss how the water may have become polluted.
5. Project (groups): Plan and design an experiment to make polluted water clean.
6. Investigate how human activities may contribute to air and water pollution, and ways in which this pollution may be reduced/prevented. Make a presentation based on the findings.
7. Carry out an experiment to arrange given water samples according to the degree of turbidity of each sample.
8. Make a device to be used to determine the turbidity of water; demonstrate how it works.
9. Project (groups): Design and make poster, brochures, etc., suitable for public awareness programme on air and water conservation.

## **Assessment**

1. Teacher-made test.
2. Graded devices (i) for detecting air pollution and (ii) for determining turbidity of water.
3. Graded group experiments (arrange water samples by turbidity).
4. Graded research and presentations on human contribution to air/water pollution and methods to reduce or prevent pollution.
5. Graded group projects (public awareness programme brochures, posters, etc.)

## Topic: Earthquakes

### Duration: 4 Lessons

### Specific Objectives

Students should be able to:

1. Describe an earthquake as a natural process and state what causes it.
2. Identify ways in which earthquakes have an impact on the environment.
3. State the safety measures to be carried out during an earthquake, and demonstrate each measure.

### Process Skills

Observing, Communicating

### Materials

Worksheets  
Video  
TV & VCR or  
PC & Projector

### Content Summary

The balance in nature can be affected by **natural processes** such as **earthquakes**. The earth's **crust** is made up of pieces called plates; these are in constant motion as they ride on the **mantle** below. Earthquakes occur when the plates that make up the earth's crust move against or slide past one another.

### Suggested Activities

1. Discuss personal experience(s) with earthquakes.
2. Examine diagrams representing the structure of the earth and identify the parts.
3. View documentary on earthquakes and identify ways in which earthquakes affect life.
4. Role play on what to do during earthquakes.

## **Assessment**

1. Complete worksheets on dangers associated with earthquakes.
2. Oral questions on causes of earthquakes.
3. Assessed role play of emergency measures in an earthquake.

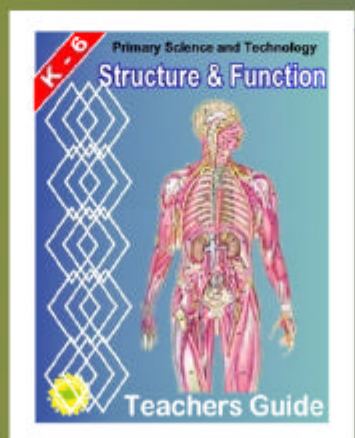
# Primary Science and Technology

Life Sciences are concerned with the characteristics and behaviors of organisms, how species and individuals come into existence, and the interactions they have with each other and with their environment. Teachers need to become acquainted with the innovation of teaching Science and Technology.

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