

Lesson 1

Ecosystems

OBJECTIVE: To communicate the concept that India's forests and natural wealth are at the core of the country's ecological health and that by saving the tiger, we are saving our forests, our water supplies and India's ecological foundation.

AIM: To help children understand the inter-connectedness of all living things in nature, their interaction with each other and with non-living components and to show how green plants sustain the life system.

INTRODUCTION: "A chain is only as strong as its weakest link."

METHODOLOGY:

- 🐾 Ask children to trace back a non-vegetarian item they ate yesterday.
- 🐾 Explain the food chain.
 - Explain the role of the sun and of green plants.
 - What are Producers?
 - Explain Photosynthesis.
 - What are Consumers?
 - Examine a long food chain (e.g. with the hawk). Introduce and explain categories of consumers: primary, secondary and tertiary.
- 🐾 Nature is not so simple. There are no stand alone food chains. All have complicated interconnections. Explain the concept of the food web.
- 🐾 Bring out the cyclical nature of resources.
- 🐾 Ask children to stack tin cans one on top of the other in the form of a pyramid. Work out the required number of tins at each level for the pyramid to be stable. Draw comparisons with each level of the food chain. Emphasise the need for a broad base.

AIDS: Chain made from paper clips, pictures, tin cans.

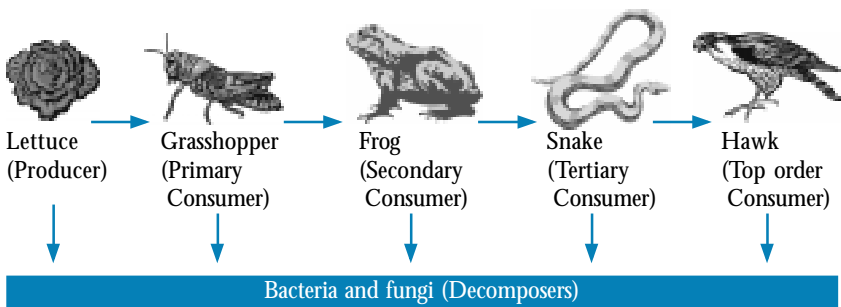
BLACKBOARD: Definitions, hawk food chain, categories above each component, food pyramid.

EVALUATION: Select various animals and ask children to place them in the correct categories. Prepare other food chains. Can the same species occupy more than one category? Pick important top carnivores.

Ecosystems

A community and its interaction with the abiotic environment is known as an ecosystem. Lakes, rivers, oceans, mountains and grasslands are all different ecosystems where there is interaction and interdependence among the different species and of the species with their environment.

Food Chain: A food chain depicts the food-dependency relationship among species in an ecosystem. It is much more than a who-eats-whom cycle. It also shows the flow of energy through the living system.



Producers: Green plants use sunlight to produce foods, so they are called producers.

Photosynthesis: How do green plants “produce” food? If all consumers depend on green plants, does this mean that green plants are self-sufficient independent units? In nature, all species are interdependent. And green plants are no exception. They make food in the presence of sunlight from carbon dioxide, water and minerals, which are partially provided by decomposers. These organisms feed on dead plants and animals and break down the complex components in their bodies to carbon dioxide and minerals that are absorbed and used by plants. Roots absorb water, while leaf pores take in carbon dioxide. Solar energy from sunlight is trapped with the help of a green pigment called chlorophyll and converted to chemical energy (simple sugars and starch).

Carbon dioxide + Water $\xrightarrow{\text{Sunlight}}$ Glucose (sugar) + Oxygen

Consumers: All populations that depend on these plants for food are consumers.

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Food Web: In nature, the links of a food chain are by no means rigid. For instance, in the food chain on the previous page, grasshoppers will eat more than one kind of plant. Snakes would eat rats and frogs. So there are no isolated food chains, but rather gigantic food webs with several thousand food chains enmeshed within them.

Ecological Pyramid

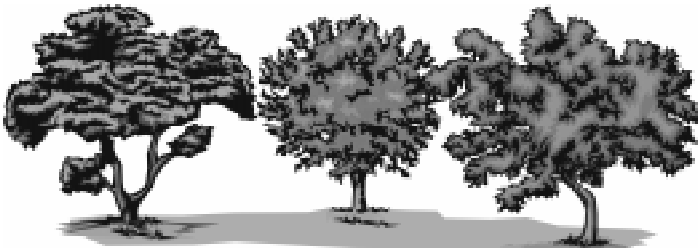
Energy flow in an ecosystem: Energy from the sun is tapped by green plants or producers by photosynthesis and flows through the ecosystem with each higher-order consumer getting a proportionally smaller percentage of the original solar input.



Secondary Consumers (Carnivores)



Primary Consumers (Herbivores)



Producers (Green Plants)

Ecosystems

Activities based on the Ecosystem Lesson Plan

- ◆ Make a food chain with coloured animals. You can even make recycled paper animals (check out how to make paper tigers on page 24).
- ◆ Make a Food Web on a wall using wool.
- ◆ Web of Life: The class sits in a circle. Each student is given a card with one element of nature [sun, soil, air, water, tree, grass, flower, fruit, leaf, insect (grasshopper, butterfly), bird (kingfisher, parakeet, eagle, vulture, bulbul, sparrow), animal (bear, tiger, gaur, snake, rat), fish, human being]. The number of elements used can vary with the number of children in the class.

Take a ball of string and give it to the child who is the 'sun' explaining how the sun helps life on earth. The sun winds the string on his/her finger and extends it to a tree, the tree gives it to the bird, and the same thread moves on, linking more and more species... with the children weaving their own web of life.

Take the game a step further. Introduce changes. A tree is cut. The child who is the 'tree' removes the string. Who is affected? The insects and the birds, as they lose their food source and homes... Continue the process using other examples such as poaching, use of pesticides, etc.

- ◆ Who am I?: Pin cards with the name and picture of an animal, bird, insect and other constituents of the ecosystem on to a child's back and the others can make the child guess the card. The child can ask questions that are answered by the class only in a 'yes' or 'no'. For e.g.: Am I an animal? Am I a bird? Do I live on land? Do I live in water? Am I a herbivore? Do I eat insects? Am I green in colour? The child must guess who they are within a limited number of questions (e.g. 20). If the child is unable to guess, then a distinctive trait or physical feature can be given as a hint.

(Courtesy: Purnima Datt)