Exploring Ecosystems in the Classroom

Subject: Life science

Grade: 6-8

Lesson Topic: Ecosystems

Length: 1+

Learner Objective:

Students will gain an understanding of the components of ecosystems.
Students will understand the vocabulary used to describe and define ecosystems.
Students will be able to differentiate between abiotic and biotic components of an ecosystem.

Introduction:

This collection of activity ideas is intended to supplement the regular life science ecosystem units normally taught. It provides the classroom teacher with the necessary vocabulary and concepts common to the study of ecosystems, provides a variety of activities that may stand alone or be added to the regular curriculum and can be used to transition from a broad approach of ecosystem study to one that incorporates alien weed species as the integrating context by which students study the dynamics of ecosystems in their own community.

Content:

The earth's living layer, or biosphere, is the largest ecosystem. Ecosystems may also be as small as a tiny weedy patch in the corner of a parking lot, or a puddle. Wherever you find a select group of living and non-living things interacting with each other can be considered an ecosystem.
Within each ecosystem, no matter the size, there are populations of living things (biotic), with their own particular habitat that best supports their lives. The habitat may support several populations of organisms that interact with one another and form a particular community or association. The habitat must supply the needs of the community from the non-living things (abiotic) in the form of food, water, nutrients, sunlight, and temperature. Plants are unable to move from a habitat where their needs are not met, but many have evolved mechanisms of adaptation. The plants are best adapted to particular niches within the community where the greatest number of their needs is met. Animals, on the other hand, are able to move to more suitable niches if their needs are not met. Since two or more species of plants or animals cannot occupy the same niche at the same time, it follows that competition, predation, cooperation, and symbiosis may occur, and consequentially, the plants and animals evolve strategies to deal with these processes. Therefore, each biotic population has it's own specific niche, sharing a general habitat with other populations to different degrees of cooperation and competition, and all utilizing the available abiotic resources.

The earth is also one very large biome, a place defined by particular, overlapping habitats. The most dominant biomes are deserts, tundra, grasslands, and large forested groups such as the rainforest and northern temperate forests. Many of our

National Parks of the Pacific Northwest Region are within the Great Basin Ecosystem, which encompasses a range of biomes.

Although we are often focused upon the biotic components of the world around us, it is the cycle of energy and abiotic factors that defines and determines the success of any biome, habitat, or ecosystem. The sun is the driving force behind the flow of energy in our biosphere, and all living things require energy in one form or another. The transfer of energy occurs because all living things have particular functions within the ecosystem: producers, consumers, decomposers, and scavengers. Energy within the ecosystem is transferred by these functions within the food chain.

Just as energy is cycled through the system in the give and take of nutrients, so also are other abiotic factors such as water (the water cycle), gases, and minerals. For each living thing to survive within a particular habitat there must be a system of conservation, where through a recycling of all abiotic substances maintains a supply of resources available a different moments to the living things best adapted to utilize those resources. When a resource becomes limited or disappears, living things may become endangered or extinct.

It must not be forgotten that humans too, are an abiotic partner in the earth's ecosystem, with all the same needs and functions of other living things. Since we are mobile and adaptable to a wide variety of habitats, our footprint upon the earth carries greater weight. As we shall see in later units, sometimes we alter the available resources and create an imbalance to the system of conservation that affects the ability of other living things to survive. And in some cases, by altering habitats we cause the demise of native species and invite *Aliens In Our Neighborhood*.

Materials and Supplies:

Materials required are dependent upon the activities, chosen from the list below.

Anticipatory Set:

Show the students a potted plant, an aquarium (or fish bowl), a glass of water, a moldy sandwich, and a clear glass of soda or tonic water. Ask them to point out which items are ecosystems and for them to explain/defend their assertions.

Activity Outline:

The above background information is intended to provide a guide to a variety of activities that may be done in the classroom to introduce students to ecosystems. There are many activities, and variations of them, of ecosystem studies that are found in a great number of life science textbooks, the Internet, and other sources. A few of the most common are listed here:

- Build a classroom aquarium, or have each student design their own using the popular *Bottle Biology* (Bottle Biology Project. 1993. Department of Plant Pathology, College of Agriculture and Life Sciences, University of Wisconsin-Madison. Published by Kendall-Hunt Publishing Company. ISBN 0-8403-8601-X).
- Build/design a terrarium, an ant farm, a butterfly habitat
- Create a collage of pictures depicting a particular ecosystem from pictures cut out of old magazines.

- See also the matrix which cross-references this activity with similar activities by Project Learning Tree and Project Wild

Students can keep a journal of their daily observations. A great project is for the students to make their own Ecosystem Journal, and a good source for book binding is *Written and Illustrated By: A Revolutionary Two-Brain Approach for Teaching Students How to Write and Illustrate Amazing Books* by David Melton, 1985, published by Landmark Editions. ISBN: 0933849001

Closure and Assessment:

Student journals can used to assess understanding of key concepts. Their observations and reflections should utilize the above vocabulary. Journals kept over a period of time should demonstrate a movement from inference to true observation. Students may also exhibit understanding through oral presentation of the ecosystems they created.

Independent Practice and Related Activities:

Students may wish to expand their studies of classroom ecosystems by recording specific data (temperature, moisture, plant growth, mortality, pH, etc.) over time, by manipulating variables, and by developing and testing hypothesis through experimental design and process.

(These aspects of research may be used to adapt this lesson plan to upper middle school and high school classes)

Resources:

Bottle Biology. Bottle Biology Project. 1993. Department of Plant Pathology, College of Agriculture and Life Sciences, University of Wisconsin-Madison. Published by Kendall-Hunt Publishing Company. ISBN 0-8403-8601-X

Written and Illustrated By: A Revolutionary Two-Brain Approach for Teaching Students How to Write and Illustrate Amazing Books by David Melton, 1985, published by Landmark Editions. ISBN: 0933849001

Vocabulary:

Abiotic, Adaptation, Biosphere, Biotic, Community, Competition, Consumer, Cooperation, Decomposers, Endangered, Extinct, Food Chain, Habitat, Niche, Population, Predation, Producers, Recycling, Scavengers, Symbiosis

National Science Education Standards:

Science as Inquiry - CONTENT STANDARD A:

As a result of activities in grades 5-8, all students should develop

- ❑ Abilities necessary to do scientific inquiry
- ❑ Understandings about scientific inquiry

Physical Science - CONTENT STANDARD B:
As a result of their activities in grades 5-8, all students should develop an understanding of

- ❑ Transfer of energy

Life Science - CONTENT STANDARD C:

As a result of their activities in grades 5-8, all students should develop understanding of

- ❑ Structure and function in living systems
- ❑ Regulation and behavior
- ❑ Populations and ecosystems
- ❑ Diversity and adaptations of organisms