YEAR 1 / Grade 4: Capturing the Details of Our Forests
Content Information

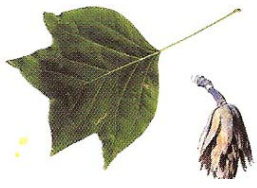
What is a temperate deciduous forest?

The term **"temperate deciduous forest"** refers to a type of biome**,** or ecological community, found throughout the world, including New York State and much of the eastern portion of the United States.

The word temperate refers to the climate, or weather patterns of the region. A **temperate** climate is one with small fluctuations in temperature and rainfall throughout the year.

The word deciduous refers to the type of tree most commonly found in this biome and is derived from the Latin word meaning "to fall off." **Deciduous** trees have leaves that, in order to conserve water in the winter, change color, fall off the tree and die as the temperature drops each year. Deciduous trees are usually flowering plants, blooming once a year in the spring.

Below is a list of deciduous trees that are common to Wave Hill's Herbert and Hyonja Abrons Woodland, accompanied by pictures of their leaves. When you come to visit, look closely! You might be able to identify some of these trees by matching the leaves and seed pods you see in the Woodland to the pictures below.

Sugar Maple	
Red Oak	
Tulip Tree	

Source:*2005 NYC Street Trees Census.* City of New York Parks and Recreation

What is an ecosystem?

An **ecosystem** is any set of living species (i.e., plants, animals, fungi, and bacteria) and the non-living components on which they rely (i.e., bedrock, soil, temperature, and water).

Usually, scientists say that the boundary of an ecosystem is the area where many of the species that comprise the particular ecosystem are no longer found. This is often due to changes in the non-living components of the ecosystem, when a prairie turns into a deep canyon, for example, or where water meets land. These boundaries can be sharp or gradual. A sharp boundary can be found where ocean cliffs separate marine ecosystems, while a good example of a gradual boundary would be the "line" between the southern deciduous forests and the northern evergreen forests of the Eastern seaboard.

Many smaller ecosystems can be found within larger ones. An ecosystem can be as small as a raindrop or as large as all of the oceans, depending on who defines it and for what purpose.

What are abiotic, producers, consumers and decomposers?

In the forest, everything is connected. Many times when people define a forest, they think only of living or **biotic** components, such as plants and animals. Non-living or **abiotic** components are just as important to any ecosystem. An easy way to remember all the components of a forest is to think of "APCD", which stands for abiotic, producers, consumers and decomposers.

A: Abiotic components have never been alive and can include elements such as bedrock, water, sun, and air. We can contrast abiotic and biotic components. **Biotic** components**:**

- **Grow and die**
- **Reproduce**
- **Use resources, such as food and water, and produce waste**
- **Respond to their environment**
- **Consist of small units called cells**

Biotic components can be divided into three groups based on how they obtain energy: producers, consumers and decomposers. These groups represent the ecological roles, or niches, of organisms.

P: Producers create their own energy through **photosynthesis.** Photosynthesis is the conversion of sunlight, water and carbon dioxide into food in organisms that contain **chlorophyll**. Examples of producers include algae, plants and some bacteria.

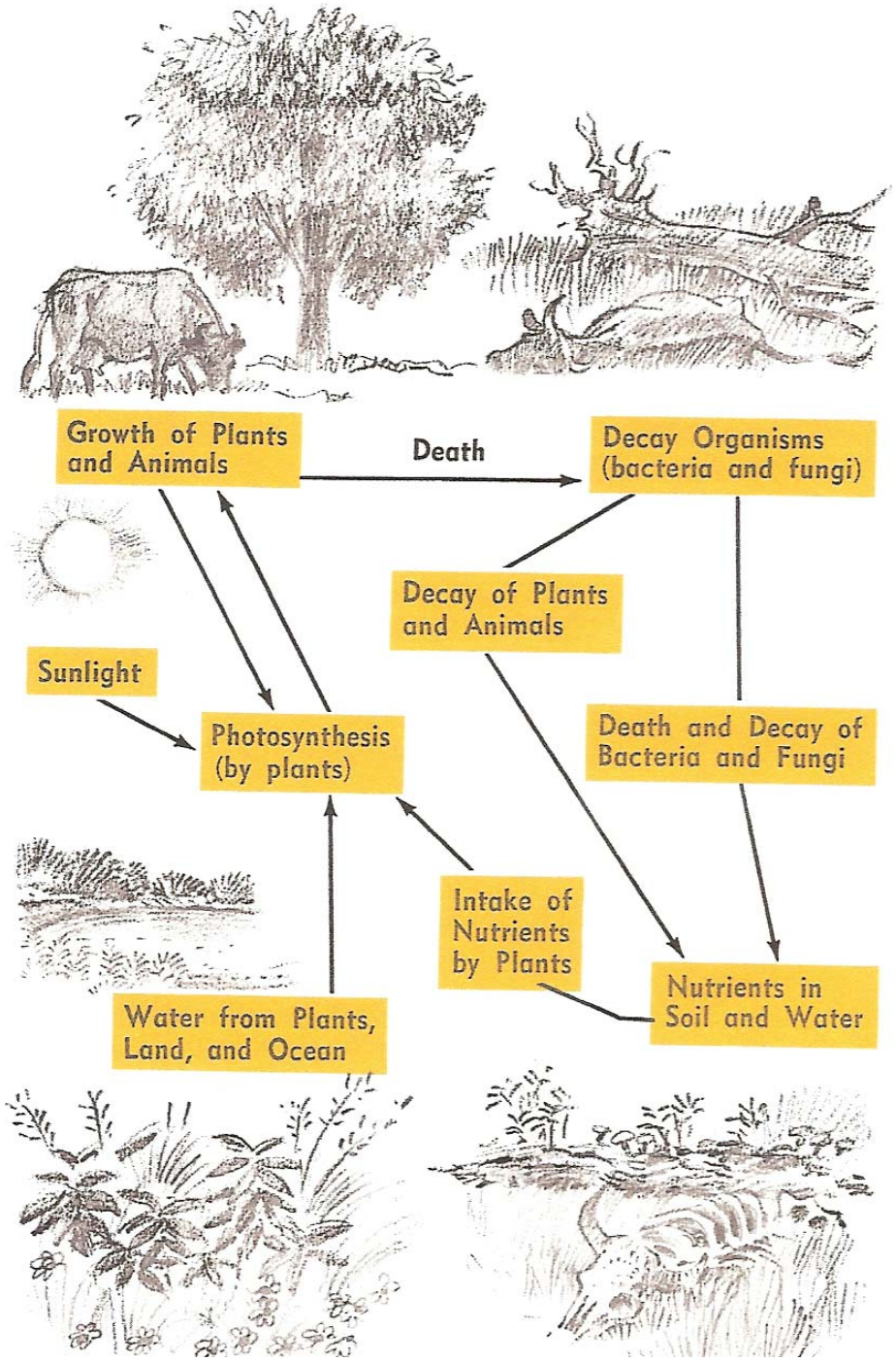
C: Consumers eat producers and/or other consumers to obtain energy. Consumers include animals and some parasitic and carnivorous plants.

D: Decomposers get energy by breaking down dead producers and consumers into basic nutrient components. Producers can use these nutrients as they are taken up through the roots in the soil. Decomposers include fungi, many bacteria, and some small, mostly microscopic, animals.

Look at the diagram on the next page to see the interrelationship between producers, consumers, decomposers and abiotic components.

Content Information

What are abiotic, producers, consumers and decomposers?

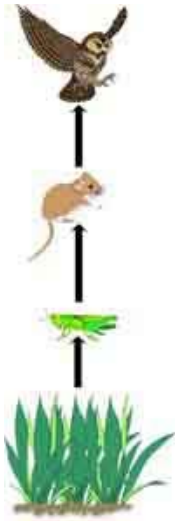
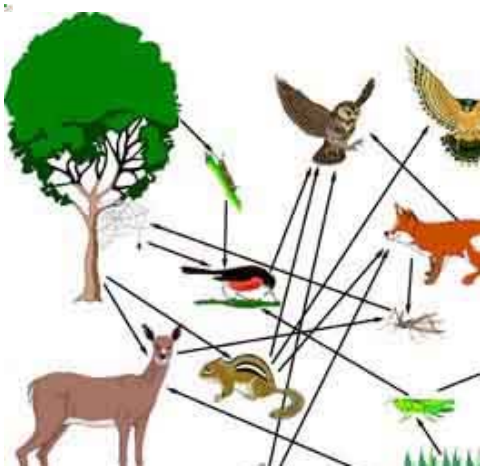


Source: Schlichting, H.E., Jr. & Schlichting, M.S. (1971). *Ecology, The study of the environment.* Austin: Steck-Vaughn.

What are food webs and food chains?

Food chains are models that illustrate how plants and animals in an ecosystem are linked by their feeding relationships. Plants and animals are usually part of several food chains simultaneously.

Food webs are models that show how different food chains combine to form a more complex system such as the one pictured below.

Food Chain	**Food Web**
One path of energy	**Everything is connected**
	

Source:ScienceBOB.com:http://www.sciencebob.com/lab/q-web-chain.html

Food that passes through the food chain is energy.

At each level of the food chain, some of the energy is used and some is stored, reducing the amount that can be passed on to the next level. This means that the higher the level of the food chain, the fewer organisms can be supported. When we talk about the different levels of the food chain in terms of how much energy is available, we call them **trophic levels.**

What are population, competition and interdependence?

A **population** is a group of organisms of the same species that live together in the same area at the same time.

Habitat is the area or environment that provides everything a plant or animal needs to survive: food, water, air, shelter and protection, and space. Members of a population compete with each other for these essential resources and for mates.

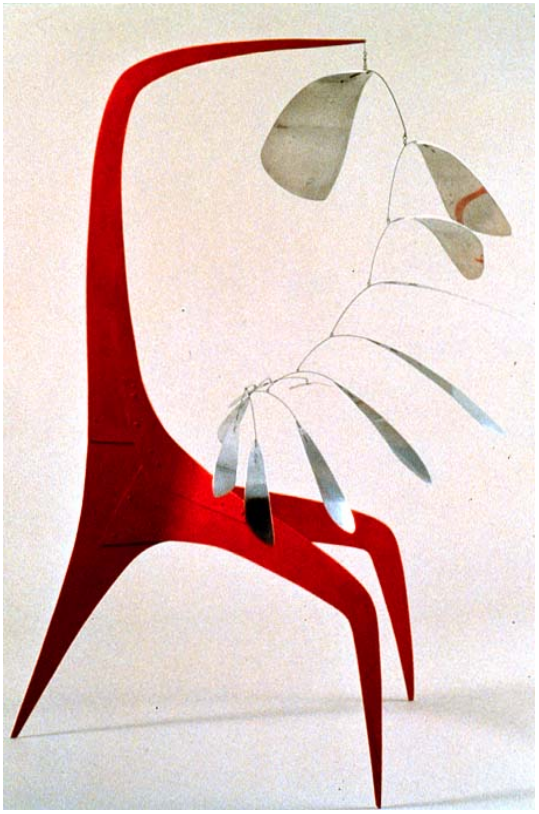
Competition also occurs between different populations. Every environment provides limited amounts of food, water, shelter, space and sunlight or energy. The greater the numbers of organisms that use these resources, the less are available for use by other organisms.

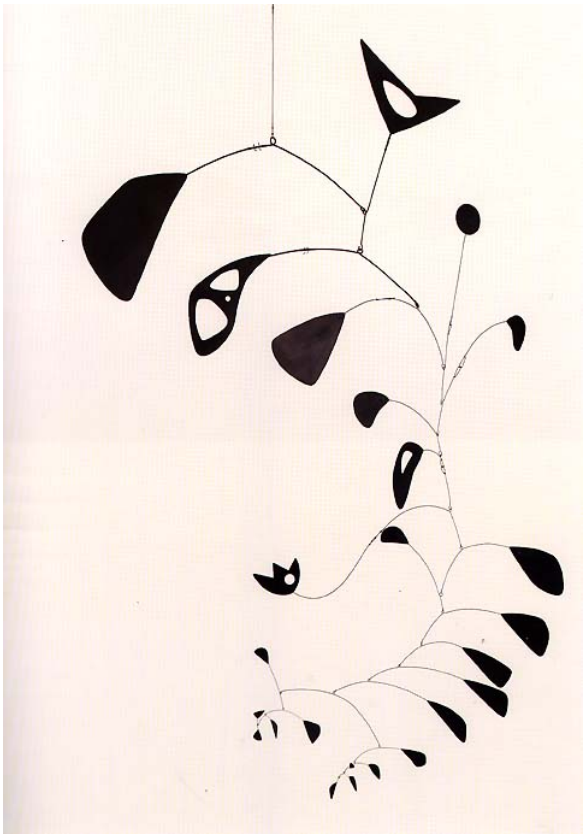
Based on the amount of available resources, each environment is only able to support a certain sized population over a long period of time. This is known as its carrying capacity.

Nature and natural processes are designed to constantly maintain the carrying capacity of a given environment. Factors such as natural enemies or predators, limited resources including food, water and light, and migration of animals all work together to maintain relatively constant population levels. This natural **balance** is called **equilibrium** and is constantly changing and/or maintained by organisms to sustain all life.

What is a mobile?

A **mobile** is a type of sculpture, or a three dimensional work of art, that demonstrates gesture, movement, expression and attention to the **balance** of its components. Alexander Calder created the first mobiles in the early 1930's. His mobiles were the result of his interest in exploring the kinesthetic element of sculpture. (Kinesthesia is the term we use to describe the way we sense body movement and position, which we learn mainly from stimulation of the nerve endings in our muscles, tendons and joints.) Calder's contemporary, Marcel Duchamp, coined the term mobile. Below are some examples of Calder's work.





Source:Write Design Online: http://www.writedesignonline.com/history-culture/mobiles/overview.htm

Curriculum Keywords and Vocabulary

Throughout your school's partnership with Wave Hill, your class will be introduced to many new vocabulary words. A list of key terms for the four student sessions is provided below. All of these terms can be found in bold-faced print, along with a discussion of their definitions in the *Content Information* section of this curriculum. Students will better retain their understanding of this new vocabulary if they are exposed to the words frequently. Therefore, we have provided some suggestions of how to incorporate these words into your classroom environment as well as into other subject areas of your curriculum.

Word Wall

A Word Wall is a designated area of the classroom where the class can keep a cumulative list of new vocabulary words. Words are added to the wall throughout the year. Seeing the words every day in the same place in the classroom helps students to master their meaning, pronunciation and spelling. Students can be selected to take turns using boldly colored markers to write the new words on construction paper. Have students cut around the shape of the letters in order to visually reinforce the shape of the new word. Incorporate an art component to your Word Wall by adding student illustrations or photographs of the new terms. Learn the translations of these words in other languages and add these to the Word Wall as well.

Cross Curricular Connections

Many of the words we will introduce can also be integrated into other areas of your curriculum. The resource list at the end of this section contains many trade books and websites on topics related to ecosystems and temperate deciduous forests. These can be used for building general literacy and technology skills. Reflecting on new material covered during the partnership sessions, students can practice their writing skills in journal responses or poems that use new vocabulary words. Create mathematical word problems that contain some of the new vocabulary words or that are based on concepts learned during the partnership, such as population fluctuation or trophic levels. For Social Studies, continue to use and reinforce these words as you learn about temperate deciduous forests in other parts of the world, or take a walk in your local neighborhood and observe the ecosystems that you find.

Key Words

Visit 1	Visit 2	Visit 3	Visit 4
Temperate	Consumer	Population	*This visit will be an opportunity to review many of the new words by integrating them into the session's activities.*
Deciduous	Producer	Competition	
Ecosystem	Habitat	Trophic Level	
Classification	Photosynthesis	Mobile	
Abiotic	Chlorophyll	Balance	
Biotic	Food Chain	Equilibrium	
Cell	Food Web		
	Interdependence		
	Energy		

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Lawrence Hall of Science. (1994). *Terrarium habitats.* Berkeley, CA: The Regents of the University of California.

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www.fi.edu/tfi/units/life.

Marietta College Ecosystems Overview: Retrieved July 13, 2006 from the World Wide Web:
http://www.marietta.edu/~biol/102/ecosystem.html#Overview.

Spurgeon,R. (1988). *Ecology*. London: Usborne Publishing, Ltd.

Images:

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www.physicalgeography.net/ fundamentals/9k.html.

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BOOKS FOR TEACHERS:

Barnard, E. S. (2002). *New York City trees: A field guide for the metropolitan area*. New York: Columbia University Press.

Betros, H. (1972). *Understanding schoolyard ecology*. New York: Exposition Press.

Calkins, L., & Bellino, L. (1998). Helping Children Develop the Wide-Awake Curiosity of Scientists. In *Raising Lifelong Learners: A Parent's Guide* (pp.199-214). Cambridge, MA: Perseus Books.

Cornell, J. (1984). *Sharing nature with children (Children's nature books paperback)*. Watford, UK: Exley Publications.

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BOOKS FOR TEACHERS:

Sobel, D. (2006). *Place-based education: Connecting classrooms and communities* (Nature Literacy Series Vol. 4). Great Barrington, MA: Orion Society.

BOOKS FOR STUDENTS:

Beame, R. (1989). *Leaf & tree guide.* (Backyard Explorer Series). New York, NY: Workman Publishing Company.

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Burnie, D. (1988). *Tree.* (Eyewitness Books Series). New York: Alfred A. Knopf.

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Howell, R. (1970). *A crack in the pavement*. New York: Atheneum.

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Spurgeon,R. (1988). *Ecology*. London: Usborne Publishing, Ltd.

Wiggers, R. (1991). *Picture guide to tree laves* (First Book). London: Franklin Watts.

BOARDGAMES:

Into the Forest: Nature's Food Chain Game. No date. Adapted from the *Predator Game* by Marie Miller Lowell. Ampersand Press, available at 1-800-624-4263.

WEB RESOURCES:

For Teachers:

EnviroLink: www.envirolink.org

Environmental Literacy Council: www.enviroliteracy.org

Environmental Protection Agency: www.epa.gov

Environmental Education on the Internet: www.eelink.net

Life Sciences Database (Franklin Institute): www.fi.edu/tfi/units/life

National Science Teachers Association: www.nsta.org

Kennedy Center Arts Curricula: http://artsedge.kennedy-center.org/.

MarcoPolo search engine: http://www.marcopolosearch.org/MPSearch/Basic_Search.asp?orgn_id=7

ThinkQuest: Ecosystems: http://library.thinkquest.org/11353/ecosystems.htm

Marietta College Ecosystems Overview: http://www.marietta.edu/~biol/102/ecosystem.html#Overview

For Students:

Bulaevsky, Jacobo. http://arcytech.org/java/population

Missouri Botanical Garden: http://www.mbgnet.net/ and http://www.mbgnet.net/bioplants/

Enchanted Learning: www.enchantedlearning.com/biomes

Exploring the Environment: http://www.cotf.edu/ete/modules/k4/biomes/Boverview2.html

EcoKids: www.ecokids.ca/pub/index.cfm

Kids Do Ecology: http://www.nceas.ucsb.edu/nceas-web/kids/

Eco-Pros: http://www.eco-pros.com/planetearth.htm