



Landscaping for Wildlife

By

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Topic: This lesson will explore how students can make landscaping or naturescaping more wildlife friendly.

Class and Level: Grades 7 – 12

Unit Length: One-two days for lesson activity and preparation in class. Several additional days may be required for actual creation of landscape garden by students.

Goals and Objectives:

- Students will comprehend the essential elements needed for promoting wildlife habitat.
- Students will understand the terms used in habitat design and shelter for wildlife.
- Students will understand the meaning of plant hardiness zones.
- Students will learn how to create a pond to support wildlife.
- Students will comprehend how to create a pollinator garden.

Assessment: Students will work independently or in groups of two or three to design a wildlife friendly habitat. This can be two dimensional or three. This project can be specific to the area of the country in which they reside, or you may choose to expand it to include other zones. Students will research the environment they intend to model, including, plants, animals, and soil type. Students will present their models and explain the design and its purpose in a class presentation. Therefore, different students can choose different zones to depict, which then can presented or displayed at school. Implementing the project is another possibility for assessment and will take the form of effort put into the project's completion.

Warm-up: Students will work together in groups of two or three to discuss what they think the essential elements are for creating a wildlife friendly habitat. Each group will share their conclusions with the class. Make sure to include at least three flora and fauna in addition to habitat/environment as requirements in the discussion.

Step 1: Discuss the fundamental elements that need to be included to promote a habitat for wildlife. These include:

- ◆ Food

- ◆ Cover
- ◆ Water
- ◆ Places to raise young

Step 2: Vocabulary terms:

Habit - The area or environment where an organism or ecological community normally lives or occurs: *a marine habitat*.

Plant hardiness zones – A hardiness zone is a geographically-defined zone in which a specific category of [plant](#) life is capable of growing, as defined by [temperature](#) hardiness, or ability to withstand the minimum temperatures of the zone. The zones were first developed by the [United States Department of Agriculture](#) (USDA), and have subsequently been adopted elsewhere. They are categorized according to the mean of the lowest temperature recorded each winter, termed the "average annual minimum temperature". Thus if five successive winters reach respective minima of -14°C , -12°C , -8°C , -16°C , and -13°C , the mean coldest temperature is -12.6°C , placing the site in zone **7**. Definition:

http://en.wikipedia.org/wiki/Hardiness_zone

Plant Hardiness Zones map: <http://www.usna.usda.gov/Hardzone/ushzmap.html>

Overstory - The uppermost layer of foliage that forms a forest canopy.

Understory - An underlying layer of vegetation, especially the plants that grow beneath a forest's canopy.

Impervious surface - not permitting penetration or passage; impenetrable: *concrete driveways or patios*.

Nonpoint source pollution - NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

Edge Effect - The occurrence of greater species diversity and biological density in an ecotone than in any of the adjacent ecological communities.

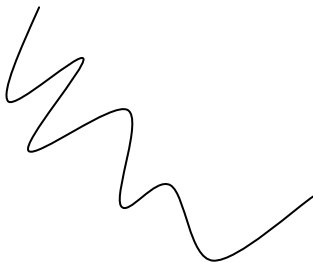
Step 3: Discuss guidelines. These include the following:

- ◆ Mirror the natural habitat by planting in layers:
 - Tall overstory
 - Small trees
 - Shrub understory
 - Smaller plants

Students might want to consider adding in a screen or trellis. This will increase the amount of planting area, especially if you are working in a small space.

- ◆ Decrease impervious surfaces. Impervious surfaces do not absorb stormwater and can create non-point water pollution problems. Since there is no vegetation growing, it also acts as a dead space for wildlife.
- ◆ Use the “Edge Effect” to create a transition zone between habits. This increases numbers and diversity of wildlife. Edges that are curvy or irregularly shaped have more edge than straight beds.

More Edge



Less Edge



- ◆ By creating a diverse landscape, you can attract a variety of wildlife species that have various needs in terms of food, cover and nesting sites.
- ◆ Plant an assortment of habitats: forest, hedgerow, meadow, etc. A list of native plants by zone may be found at National Wildlife Federation website: <http://www.abnativeplants.com/?source=backyard>.
- ◆ If possible design around trees that already exist, other plants that hold importance to the property, or areas bordering the property. Using this method creates a “habitat corridor” for wildlife to easily move through.
- ◆ Lawn is dead space for wildlife. But if students insist on having lawn, keep it small or use an ecological seed mix. Think about creating a meadow by planting native wildflowers.
- ◆ If a fence must be erected between properties, consider using a living fence made of tall shrubs to add privacy and for continuation of a habitat corridor for wildlife.

Step 4: Water – Bird Baths and Ponds.

- ◆ Bird Baths for birds and other wildlife
 - Birds need water not only to drink but to clean their feathers.
 - The solution to drawing birds to your bath is to change the water every other day. This keeps the water fresh and prevents mosquitoes from breeding. Every so often, scrub the bath with a stiff brush and rinse clean.
- ◆ Ponds – Steps to create:
 - ◆ Step 1:
Dig a hole. Set the dirt and rocks aside to be used later. If students are not going to dig out the whole pond at one time, spray the hole with water to loosen up the dirt for the next time you dig. If students are working with a pre-formed liner, they should put it down on the ground and outline the shape that will be dug, making sure that the liner covers the hole and extends over the edges. Double-check that the bottom is flat. The pond should be at least one to 3 feet deep. The deeper the pond, the more likely your chances of attracting frogs that will hibernate close to the bottom during the cold months.
 - ◆ Step 2:
Smooth over any rough areas to protect the lining. In addition, check to see if your pond site has roots or rocks. If it does, take care that the roots and sharp edges of the rocks do not puncture the liner when you are padding the site with sand or carpeting. Enable the sides of the pond to gently slope down for greater accessibility by animals.
 - ◆ Step 3:
Install the liner. Take the dirt and rocks you dug out of the hole, and cover the edges of the liner.
 - ◆ Step 4:
Fill the pond with water and water the plants.

To attract frogs, do not put fish in the pond because they eat frog eggs and tadpoles. If students would still like to put fish in their pond, they need to create places for frogs to hide using leafy branches. Branches provide shelter as well as

nourishment. Use rocks and vegetation to create islands to avail frogs and dragonflies a spot to rest on.

Shelter and Habitat to Rear Young

Discuss with students how they can use the landscape they are designing to create a safe place for wildlife to live and raise their young. Some methods of providing cover are:

- Using existing vegetation both dead and alive.
- Shrubs that have bushy leaves provide cover.
- Some wildlife use dead trees to rear young and for safety.
- Rocks, logs, and brush offer wildlife safe haven.
- Nesting boxes for birds to rear their young. The following website gives recommendations about nesting boxes:
www.ces.purdue.edu/extmedia/FNR/FNR-246-W.pdf
- Students can make what is known as a “toad abode.”
 - You need one medium-size clay pot and saucer.
 - Put the saucer on the ground and keep it filled with water.
 - Put the pot upside-down with the edge resting on a rock to enable the toad to fit through and hide inside.

Partnering with Pollinators: How to draw them to your garden.

Pollen - the microspores that carry the male gametophyte of seed plants.

Pollination - the transfer of pollen from the anther to the stigma.

Pollinator - an insect or other vehicle by which pollen is carried from one flower to another. A plant that provides pollen for a self-infertile plant.

Definitions from: <http://www.hcs.ohio-state.edu/mg/manual/glossary.htm>

In biology, **mutualism** is an interaction between two or more species where both species derive benefit. Mutualisms can be lifelong interactions involving close physical and biochemical contact (known as symbiosis) such as those between plants and mycorrhizal fungi; they can also be briefer, non-symbiotic interactions, such as those between flowering plants and pollinators.

(<http://en.wikipedia.org/wiki/Mutualism>)

Background. Many plants are dependent on insects such as bees, wasps, butterflies, beetles, and flies as well as animals such as bats and hummingbirds to transfer pollen from the anther (the male part of the flower) to the stigma (the female part of the flower) in an effort to produce offspring. In exchange, the flower shares its sweet nectar, fat and protein rich pollen with its pollinator.

Each species of flower is constructed in a manner from the layout of its petals, to the specific time of the year it blooms, for the purpose of luring a particular pollinator for reproductive purposes.

- ◆ Ask students why we should care about this relationship?
 - One out of every three bites of food we eat is made possible because of pollinators, and 80 percent of all flowering plants rely on pollinators for survival.

- Insect pollination is a necessary step in the production of most fruits and vegetables we eat and in regeneration of many forage crops used by livestock. Recent surveys document that more than 30 genera of animals -- consisting of hundreds of species of floral visitors -- are required to pollinate the 100 or so crops that feed the world. Only 15% of these crops are serviced by domestic honey bees, while at least 80% are pollinated by wild bees and other wildlife.
<http://www.pmac.net/birdbee.htm>
- Birds and other animals depend on those seeds for food too. Without wild insects pollinating flowers, the whole food chain suffers.
- ◆ What role do people play in weakening pollinator/plant relationships?
 - Overuse of pesticide may kill pollinators that are beneficial.
 - Land fragmentation due to development, has a serious impact on migrating pollinators, such as the monarch butterfly because it isolates plants. This leaves them less likely to be pollinated by a cross-section of pollinators, thus affecting sustainability of the plants and their partners. (You might want to present students or have them look up other cases of mutualism such as the relationship between the dodo and the tambalacoque also known as the "dodo tree," which was hypothesized by Stanley Temple (1977) to have been eaten from by Dodos, and only by passing through the digestive tract of the dodo could the seeds germinate; he claimed that the tambalacocque was now nearly extinct due to the dodo's disappearance.)

Students can have an impact on the above by planting a home and/or schoolyard garden, or container gardens. These gardens can act as a sanctuary in the middle of a concrete jungle. This will also give students an opportunity to explore the relationships between plants and animals. For a further investigation into a specific pollinator's sudden decrease, the honeybee, visit:

<http://www.washingtonpost.com/wpdyn/content/article/2007/03/16/AR2007031600889.html>

How to create a pollinator garden.

- ◆ Find a location that receives 6 hours of full sun per day.
- ◆ Understand the basic needs of wildlife including pollinator needs. See above section on wildlife.
- ◆ Assignment:
 - Observe pollinators that are already living in the community as well as the types of plants they frequent. This may be done in a variety of environments, giving students an understanding of which environments attract the most pollinators.
 - Have students gather data on a particular habitat. This can include varieties of plants, types and numbers of pollinators and other animals. You may want to have students observe at different times of the day.

- Ask students to note the type of plant life including trees and grasses. Have them study the characteristics of the flowers, including physical structure, patterns, and colors. Ask students to note the relationship between the flower's layout and the physical structure of the pollinator.
- Have students analyze the data they collect to determine how biodiversity affects the health of the ecosystem they are investigating. What constitutes a healthy ecosystem? Why?
- ◆ When the above assignment is complete, continue discussing creation of a pollinator garden.
- ◆ Decide what types of pollinators you would like to attract. For example, use the following chart as an example, from:
<http://www.kidsgardening.com/growingideas/projects/jan03/pg1.html>

Pollinators	Flower Preferences
<p>Bees</p> <p>Did you know? There are about 4,000 species of native bees in the U.S. ranging in length from less than one eighth of an inch to more than one inch. Most of these bees are "solitary" nesting and, having no hive to defend (as do nonnative honeybees), they are unlikely to sting!</p>	<p>Yellow, blue, purple flowers. There are hundreds of types of bees that come in a variety of sizes and have a range of flower preferences. They can't see red, but are attracted to some red flowers, such as bee balm, that reflect ultraviolet light. Small bees, which have short tongues, prefer packed clusters of tiny flowers (e.g., marigold, daisy, butterfly weed, aromatic herbs).</p>
<p>Butterflies</p>	<p>Red, orange, yellow, pink, blue flowers. They need to land before feeding, so like flat-topped clusters (e.g., zinnia, calendula, butterfly weed, yarrow, daisy) in a sunny location. They also need food sources for larvae and places to lay eggs. These include milkweed, aster, lupine, thistle, fennel, violets, hollyhock, black-eyed Susan.</p>
<p>Moths</p>	<p>Light-colored flowers that open at dusk such as evening primrose.</p>
<p>Pollinating beetles</p>	<p>They prefer wide-open flowers, such as aster, sunflower, rose, and butterfly weed.</p>
<p>Flies</p>	<p>Green, white, or cream flowers. They have short tongues, so prefer simple-bowl shapes.</p>
<p>Hummingbirds</p>	<p>Red, orange, purple/red tubular flowers with lots of nectar (e.g., honeysuckle, sage, fuchsia, jewelweed, fireweed, cardinal flower, bee balm, nasturtium, century plant). No landing areas are needed since they hover while feeding.</p>
<p>Bats</p> <p>(Pollinating bats are found primarily in the Southwest)</p>	<p>Large, light-colored, night-blooming flowers with strong fruity odor (e.g., many types of cactus).</p>

- Plant native plants because these have evolved to meet the needs of native insects.
 - Make sure the plants meet the needs of pollinators in terms of accessibility to nectar and pollen.
 - Try to plant flowers with a range of shapes and sizes. Trumpet or cup-shaped flowers, such as cardinal flower, honeysuckle, and bee balm, attract a wide range of pollinators. Pollinators with shorter tongues, such as small native bees and wasps, feed on tightly packed clusters of small flowers, such as those found on milkweed, zinnia, phlox, and mint. Hummingbirds feed on red, purple, or orange flowers with lots of nectar, such as bee balm, fuchsia, sage, and nasturtium.
 - Include a variety of flowers that bloom throughout the season. By doing so, you will accommodate different pollinators' preferences and provide a sequence of pollen and nectar sources throughout different life cycle stages. Consider shrubs and trees, such as dogwood, blueberry, cherry, plum, and willow that provide nectar or pollen in early spring when other food is scarce.
 - If your growing space is limited, consider growing the following types of pollinator plants in containers filled with a rich, well-drained soil mix: Aromatic herbs (coriander, catnip, mint, parsley, lavender); annuals (marigold, phlox, bachelor's button, zinnia, cosmos, salvia); perennials (bee balm, Shasta daisy, iris, coneflower, lobelia, delphinium).
 - Use containers, if necessary. If your growing space is limited, consider growing the following types of pollinator plants in containers filled with a rich, well-drained soil mix: Aromatic herbs (coriander, catnip, mint, parsley, lavender); annuals (marigold, phlox, bachelor's button, zinnia, cosmos, salvia); perennials (bee balm, Shasta daisy, iris, coneflower, lobelia, delphinium).
 - Include food sources (host plants) and overwintering places for eggs and larvae. Allow a section of your schoolyard to revert to wild grasses, weeds, and wildflowers (e.g., milkweed and Queen Anne's lace), and plant dill and parsley for larvae.
 - Provide water. Pollinators such as butterflies can gather and sip at shallow pools, mud puddles, and birdbaths, and bees and wasps to build nests.
 - Avoid using pesticides and herbicides. Many can be harmful to pollinators as well as pests. Herbicides may wipe out key plants (weeds) that are important for pollinators' food mix. If you feel that you must control pests, judiciously use homemade remedies such as garlic spray, or pesticides derived from plants or microbes. Apply them only after sundown, when most pollinators have stopped their rounds.
 - Provide nesting sites and materials. Leave cut plant stems exposed, turn flowerpots with bottom holes upside down, leave twigs and brush in small piles, create mud puddles, or put out pieces of string or other light fibers.
- The above material is sourced from:

<http://www.kidsgardening.com/growingideas/projects/jan03/pg1.html>

◆ **Additional Resources:**

Kids Gardening:

<http://www.kidsgardening.com/growingideas/projects/jan03/pg1.html>

National Wildlife Federation:

<http://www.abnativeplants.com/?source=backyard>

Ohio State University: <http://www.hcs.ohiostate.edu/mg/manual/glossary.htm>

Purdue University's nesting boxes:

www.ces.purdue.edu/extmedia/FNR/FNR-246-W.pdf

Earth Day Network's Teacher's Corner:

<http://www.earthday.net/involved/teachers/default.aspx>