

## **Four Winds Nature Program - Ecosystems**

Connections with Farm to School and Forest Days/Outdoor Learning Programs

An ecosystem consists of all the living and the non-living things in a particular place, like a forest, a pond, or the soil under a field. All the organisms in an ecosystem depend on all the other things – both living and non-living – for food and other needs. When we study ecosystems, we'll be thinking about the interactions of organisms with each other and their environment. We'll consider how energy flows from sun to plants to animals, how plants and animals are linked in a food web, and how matter cycles through organisms and back into the soil.

We'll meet some animals and plants that are part of different ecosystems, and consider the interactions we observe as we explore the outdoors. Throughout the year, students will examine the characteristics of organisms and consider the interconnections among living and non-living systems in the Earth's environments.

### ***Signs of Leaf Eaters***

*Students will: view examples of leaf-feeding, noticing patterns and grouping by shared characteristics; observe and record signs of leaf-eaters and other animals on the school grounds; collect leaves with evidence of leaf-eating or shelter-building insects/spiders; and model how plants and animals in an ecosystem are connected in a complex food web.*

#### Farm to School

- Look for evidence of leaf-feeding on garden plants, noting why some plants are eaten while others are left alone.
- Visit a local farm to observe signs of leaf-feeding and the methods a farmer employs to discourage damage to crops.
- Observe the use of leaves for shelter by various insects and spiders, and consider the role these species have in controlling leaf-feeding insect populations.

#### Forest Days/Outdoor Learning

- Collect and draw leaves that have evidence of leaf-feeding and make guesses as to which insect left its mark.
- Sit quietly at sit spots and try to observe active leaf-feeding.
- Model being a leaf-feeding insect- which plants would you choose and why?

### ***Life in the Dirt***

*Students will: learn about the four components of soil; view special characteristics of earthworms and consider how these make them well-suited to life in the soil; examine the soil and its inhabitants; visually depict life in the soil, noting plants and animals above and below ground; and record observations about a soil organism.*

#### Farm to School

- Take a garden soil profile, paying close attention to soil texture and presence of organic material.
- Consider the impact of soil characteristics on a plant's ability to grow and thrive.
- Survey earthworms in several different plots; compare numbers and consider why earthworms may prefer certain soil conditions over others.

- Examine the role of earthworms in the process of making compost.
- Ask local farmer for a soil sample and make observations about the four components of soil.

#### Forest Days/Outdoor Learning

- Examine soil in the forest and observe how it differs from the soils of a field or garden.
- Look for earthworms and consider why we may hope to find them in our vegetable gardens but not our forests.
- Observe other creatures found in the soil and record the characteristics that make them suited to living underground.
- Draw a cross-section of weekly sit spot, including land features, plants, and animals above and below ground.

#### ***Leaf Litter***

*Students will: learn about inhabitants of leaf litter and how they contribute to the process of decomposition; examine different kinds of leaf and tree litter that settles on the forest floor; explore a section of forest floor, making a model of the different layers and looking for evidence of decomposition and decomposers; and design and build small houses using natural materials from the forest floor.*

#### Farm to School

- Consider the importance of leaf litter when used as mulch in a school garden or compost facility.
- Visit a large-scale compost facility to learn about the process of decomposition and its role in our food cycle.
- Build "garden fairy" houses using natural materials.

#### Forest Days/Outdoor Learning

- Examine a plot of leaf litter on the forest floor and record number of creatures found within it.
- Consider why we find different decomposers in different leaf litter material.
- Construct small shelters at sit spots and quietly draw observations of the leaf litter.

#### ***Snags and Rotting Logs***

*Students will: notice the changes that take place as a log decays and turns into soil; look for evidence of animals on dead or decaying wood outside; examine a rotting log and record evidence of plants, animals, and fungi; learn characteristics of some major groups of invertebrate animals; and examine bark beetle engravings on wood and look for clues about their life cycle.*

#### Farm to School

- Study wood chips used in school garden or landscaping around the school grounds, noticing how they decay, who lives in them, and if mycorrhizal mats are present.
- Inoculate a small woodchip bed with *stropharia* spawn, observing changes over time and eventual flushes of wine cap mushrooms.

### Forest Days/Outdoor Learning

- Examine rotting logs on forest floor for evidence of insects or other animals and consider their importance in providing food and habitat.
- Look for signs of woodpeckers or other cavity feeders/nesters in standing deadwood.
- Identify various mushroom species on rotting logs and consider their role in decomposition.

### ***Staying Warm***

*Students will: identify the challenges of winter life and ways that active animals stay warm and find food; use a model to see how a warm object loses heat to its environment; compare the insulating properties of different materials; model how animals are active or dormant in winter; look for evidence of tracks, tunnels, and other signs of animals active near the school in winter; and make dioramas to model an animal's home and life under snow.*

### Farm to School

- Look for signs of animals around school garden or compost and consider which adaptations allow them to remain active during winter.
- Consider the role of insulation for perennial plant survival in winter.
- Visit local farm to observe how domesticated farm animals adapt to colder weather and how they are helped by their relationship with humans.

### Forest Days/Outdoor Learning

- Look for evidence of animals trying to find food, noting areas where there is more activity and considering why.
- Model dormant animals by building snow shelters and remaining still; model active animals by adding insulating "fur" (multiple warm jackets) and seeking food sources.

### ***Squirrel Tales***

*Students will: find patterns of similarity and difference in the characteristics/behaviors of three tree squirrel species; examine different parts of a squirrel's body, its tracks and signs, and consider how these relate to daily life and role in ecosystem; look outside for squirrels and evidence; model nut-burying behavior and consider its effect on the ecosystem; model the challenges of balancing on thin branches; and model how far a flying squirrel can glide.*

### Farm to School

- Look for trees sprouting in school garden and consider the role of squirrels in planting nuts.
- Visit a tree nursery to learn about the process of tree planting and care.
- Make acorn meal.

### Forest Days/Outdoor Learning

- Observe gray or red squirrels in the forest or around the school, considering how they are adapted to life on the ground and in trees.
- Model a squirrel's movement on the ground versus its movement "in a tree" (on a low fallen log).

- Be a squirrel- plant acorns or other nuts in the woods and observe whether they successfully sprout; record changes over time.

### ***White-tailed Deer***

*Students will: make connections between a deer's physical adaptations and its role in the forest ecosystem; learn how much food a deer needs each day to survive winter; model how food supply regulates deer population in an area; model how herd living provides safety from predators; learn how deer visit different parts of home range as needs change throughout seasons; and use wildlife habitat maps to locate nearby deer yards.*

### Farm to School

- Visit local orchard and look for evidence of deer browsing on apple and other fruit trees.
- Examine a deer's role in garden browsing and consider the ways humans try to mitigate damage from deer and other animals.

### Forest Days/Outdoor Learning

- Sit quietly at sit spots to try and observe deer, recording drawings in nature journal.
- Look for evidence (tracks, scat, browsing) of deer around the school, noting where they seem to prefer feeding, traveling, or bedding.

### ***Stream Life***

*Students will: learn about insects that live in streams and their role in food web; look for evidence that stream speed and temperature vary along its course; look for evidence of insects or other small creatures living underwater; carefully collect and observe specimens before returning them to stream; draw the features of a nearby stream; and evaluate the health of a stream based on the kinds of macroinvertebrates found living in its waters.*

### Farm to School

- Examine a nearby stream or school garden water supply, looking for evidence of water-dwelling insects.
- Compare insects that live in streams to insects that live in gardens.

### Forest Days/Outdoor Learning

- Explore a nearby stream and the creatures that live within it.
- Float twigs to observe stream speed, noting the effects of changing width and depth.
- Look for evidence of small eddies in the stream, considering why these occur and how they might affect stream-dwelling creatures.
- Draw a stream's contours and the plants and animals that live in or around it.

### ***Forest Birds***

*Students will: model how birds avoid competition by foraging and nesting in different layers of the forest; learn special field marks of forest bird species; learn techniques for using binoculars to watch and identify birds; practice identifying birds by sight; model how vocalizing helps birds attract mates, defend territory, and stay in contact with others of their kind; and draw a cross-sectional picture of the forest, noting the locations of singing birds.*

### Farm to School

- Record birds foraging and nesting near garden, noting which food sources and nest building materials different species rely on.
- Ask local farmer to send a list or photos of birds in various habitats on their land- in barns, fields, trees, etc.
- Have a "bird food" taste test by sampling various seeds and dried fruits.

### Forest Days/Outdoor Learning

- Send messages to each other through bird song.
- Tally different bird songs or sightings from sit spots.
- Create nests using materials found in the woods.
- Set out seed and record which species visit to feed.

### ***Pond Life***

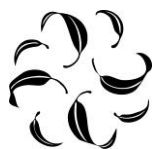
*Students will: explore a pond, looking for evidence of its inhabitants and noticing the different habitats in which they live; draw a pond in cross-section to understand the different zones of a typical pond; make close observations of pond plants and animals and record them in drawings; notice that the young of pond animals look very different from the adults; and use natural materials found near the pond to construct small boats.*

### Farm to School

- Consider the different zones of a typical pond and how they compare to zones in a garden or agricultural landscape.
- Ask local farmer what impact natural or human-built water sources have on their land and farming practices.
- Build a simple "toad pond" habitat to encourage amphibian visits to school garden.

### Forest Days/Outdoor Learning

- Visit a nearby pond and sit quietly, observing which animals live there and which animals visit for food, water, or shelter.



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