

# Eco-service Workers: Hard at Work on Your Site

## Essential Questions:

*What eco-services are provided on a school site?*

*What organisms depend upon and help provide these eco-services?*

## At a Glance:

Learners will make a key chain with eight beads, each representing a different Garden Earth Department, as prompted by a story.

## Background Information:

Every ecosystem, including school sites and backyards provide a variety of eco-services. In the Garden Earth Naturalist (GEN) program we refer to these eco-services as 'Departments'. A brief summary of each GEN Department follows.



**Food Production Department:** Humans are just one species of a very complex food web. The Food Production Department addresses the food needs of all living organisms. To be successful, the workers in this department need a diversity of plant materials to support a diversity of animals. When people cut down

forests to plant fields or build houses, and do not leave any trees or ground-covers, they remove entire populations of plants and animals that previously completed food chains within that ecosystem. When we upset the food web in one place, the effects are widespread, for all everything is connected.

**Pollination Department:** Many people only think of allergies when they hear the word pollen. However, pollination – the transfer of pollen grains from one flower to another flower to make seeds and fruits – is a vital part of a healthy ecosystem, including the one on your school site.

Over 100,000 species – such as bees, moths, butterflies, beetles, flies and even birds, mammals and reptiles - serve as pollinators worldwide. In the United States alone, pollination plays an important role in the production of more than 150 food crops including pecans, plums, corn, apples, alfalfa, and beans. Almost all fruit and grain crops require pollination to produce their crop.

**Soil Department:** The Soil and Recycling Department creates and maintains rich, life-giving soil for all creatures. Leaf litter and other materials fall to the ground and decompose with the

**Location:** Indoors or outdoors

**Objectives:** Learners will

- 1) describe the Garden Earth Departments
- 2) name organisms that help provide eco-services on their school site
- 3) list organisms who depend upon the eco-services on their school site

**Skills:** communication, listening, empathy, analysis

**Supplies:**

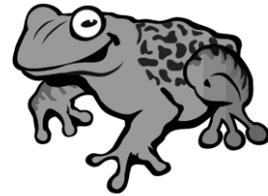
- **Script:** Garden Earth Naturalist: Daily Log
- **Beads** – one of each color for each student: red, green, brown, black, purple, blue, yellow, and orange.
- string
- split key ring
- lanyard hook-clip
- GEN pie logo disc
- small baggie or cup for each child
- pictures of GEN Department workers
- student worksheets for Part B

**Subjects:** language arts, science, art

**Time:** Part A: 25 minutes  
Part B: 45 minutes

help of soil organisms. Root systems of plants are very important in holding soil in place and maintaining quality soil. Unfortunately, plants have been stripped from many areas on your school site and throughout your community. Without the leaf litter and strong roots of plants, the soil can erode away.

**Pest and Disease Control Department:** Nature keeps things in balance. When one organism in a food web multiplies rapidly, then other organisms may increase or decrease in population, depending on whether they are prey or predator. If the condition is good for humans, we usually try to promote it; if it is bad, we try to eliminate it. This is not necessarily good for people in the long run. In understanding ways to control a pest problem, we must understand the ties organisms have to each other. If an ecosystem is healthy, it can control its own pest problems through species diversity. If we render an ecosystem unhealthy by reducing its diversity to one species (also known as a “mono-culture”, e.g., thousands of acres of wheat), when a disease condition occurs it is very hard for nature and humans to get the ecosystem back into balance.



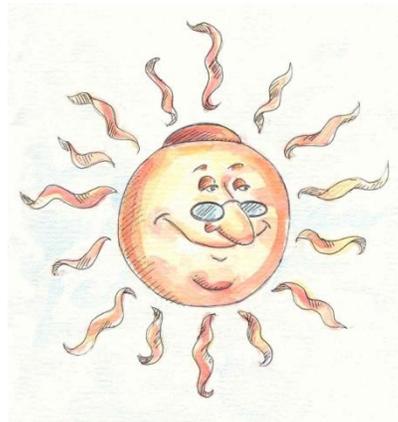
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**Water Purification Department:** Nature has an amazing ability to purify our water. As it evaporates, it leaves impurities behind on the ground or in leaves. Rainwater in unpolluted areas is very fresh and drinkable. As dirty water passes over and through the ground, the soil, rocks and microscopic plants and animals that it flows by help to remove impurities. This valuable purification service is often hampered when people damage the soil structure to grow crops or to site buildings.

**Biodiversity Department:** There are many different ecosystems on Earth and each is made up of interdependent plants and animals. Collectively, these plants and animals contribute to the biodiversity of the ecosystem. The species in the old growth forests are different from those of a grassland or pond, but within the biodiversity of their own ecosystem, food and shelter and all other needs for survival are found. Humans can adapt to live in almost any ecosystem, but we must take care not to upset the balance of these systems. If we do, important survival links will be lost. Eventually, this will threaten the availability of food, medicines, wood, rubber, and all the other materials that the Biodiversity Department provides.

**Climate Control Department:** Different geographic areas around planet Earth have different climates due to land forms and their distances from the equator and their poles. The ‘climate’ of an area refers to its weather and includes its typical temperature and precipitation, as well as the seasonal changes that occur over the course of a year. Climate, along with landform, determines the plant and animal life that are found in a particular area. The atmosphere is composed of a mixture of gases that act like a blanket, keeping us warm and protecting us from the sun’s rays. Carbon dioxide is one of these gases. The plants and animals of a healthy ecosystem help to keep



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dioxide in balance. An increase in carbon dioxide, or other atmospheric gas, can cause an increase in temperature on Earth which in turn can cause changes in the weather patterns, or climate change. A healthy ecosystem with many plants and an appropriate number of animals is kept in balance by the Climate Control Department.

All Garden Earth Departments work together to keep the ecosystems of the Earth in balance.

**Getting Ready:**

In **Part A**, learners read a story and prepare a string of beads that can be used as a key chain. Gather materials beforehand. Each child will need a set of eight colored beads, a split key ring, lanyard hook-clip, a piece of string (hemp works well), and a GEN pie logo disc. Place colored beads in cups or in individual plastic bags. Write the names of the different Garden Earth Departments and the corresponding colored bead on the board. Use the Background Information to discuss each department.

In **Part B**, learners investigate locations of the GEN Departments on their site. Prior to conducting this activity, walk the area to locate appropriate sites and school site organisms. The following chart can guide your preview walk for Part B.

<b>Garden Earth Department</b>	<b>Features to Look for on Your Site</b>	<b>Related School Site Organisms</b>
<b>Air Cleaning Department</b>	Trees and bushes	Trees Shrubs Other green plants
<b>Food Production Department</b>	Grasses or trees that produce seeds; animal signs such as tracks, nests or holes in the ground; a place where an animal such as a bird, a mouse or insect might live or a sign of an animal eating another animal or plant	Birds Small mammals Insects Lizards, frogs
<b>Pollination Department</b>	Flowers, trees and shrubs that attract pollinators	Bees Butterflies Beetles Wasps Flies Hummingbirds
<b>Pest and Disease Control Department</b>	Damage to leaves from chewing insects Invasive plant pest such as kudzu, privet hedge or Japanese honeysuckle Exotic insect pests	Bats (eat mosquitoes) Bluebirds (eat mosquitoes) Chewing insects Gypsy moth nests Fire ants mounds Armadillo holes
<b>Biodiversity Department</b>	Areas with a lot of vegetation will attract more insects and wildlife and hence; have greater biodiversity than areas with just one plant species such as a grass lawn	All plants and animals on your site.

<p><b>Water Purification Department</b></p>	<p>A wetland on your school site. After a rainstorm look for areas where water collects in low areas or around downspouts from your school roof. The entire school site is a watershed. Do you know what watershed your school is located in?</p>	<p>Fish, crawfish, snails, insect larvae</p>
<p><b>Soil &amp; Recycling Department</b></p>	<p>Any area on your school site has soil. A wooded area should have more soil organisms than an area such as a sports field that has a lot of foot traffic.</p>	<p>Worms, sowbugs, beetles, termites, cockroaches, spiders</p>
<p><b>Climate Control Department</b></p>	<p>In addition to being the source of energy for our food, the sun also provides us with heat. Clouds can shield us from the sun and make us feel cooler on a hot day. They can also be the source of rain and other precipitation. Temperature drives evaporation of water to form clouds</p>	<p>These ecosystem components are abiotic (non-living), so there are no organisms associated with this department. Look for the sun, clouds, rain or land features that can affect air flow (mountains, flat lands).</p>

### Procedure: Part A

1. Provide each student with a plastic bag or paper cup of beads, string, split key ring, lanyard hook-clip, and GEN pie logo disc.
2. Have learners attach the string to the split key ring.
3. Learners will assemble their beaded key chain as they listen to the story. Either the instructor or the learners read the story titled, 'Garden Earth Naturalist: Daily Log'. Before you say the Department name, have learners guess which department it would be. If learners are reading the essay, leave the Department blank and have learners fill in the information. Check to make sure learners have listed the correct department.
4. Once the essay is complete, learners may finish assembling their key chain. Tie off the end of the string with the beads on it.
5. Attach the lanyard hook-clip to the split key ring.
6. Lastly, attach the lanyard hook-clip to the GEN pie logo disc.
7. Follow-up discussion:

<b>GEN DEPARTMENT</b>	<b>BEAD COLOR</b>
<b>Air Department</b>	<i>Green bead</i>
<b>Pollination Department</b>	<i>Yellow bead</i>
<b>Soil Department</b>	<i>Brown bead</i>
<b>Food Production Department</b>	<i>Red bead</i>
<b>Pest Control Department</b>	<i>Black bead</i>
<b>Water Purification Department</b>	<i>Blue bead</i>
<b>Climate Department</b>	<i>Orange bead</i>
<b>Biodiversity Department</b>	<i>Purple bead</i>



Cobb County 4-H

- Can you list all the Garden Earth Departments?
- Do you think these eco-services / Garden Earth Departments could be found on our school site? Where?
- Could we survive without these eco-services? What would the world be like of there was no Food Production Department? No Air Cleaning Department? No Pollination Department?
- Can you name a plant or animal that was in the Food Production Department? Air Cleaning Department? Pollination Department? Soil Department? etc.
- Would you like to keep a log of events that take place on our site or at your home?

### Procedure: Part B

1. Use the beaded key chains to review the GEN Departments and the function of each with your learners.
2. Use photos of Department workers to discuss organisms that both depend upon these services and help provide these services on your school site.  
As you show your learners the ecosystem photos, ask:
  - Have you seen this creature on our site?
  - Where do you think it would live on our site?
  - What Department(s) does it depend upon for its survival?
  - Where do you think it would live on our school site?
3. Learners go outside and complete either

a) the attached worksheet “What Eco-services are provided by My School Site?”

OR

b) “Who is living on My School Site?” chart as they hunt for eco-services on their site. You may want your learners to prepare a school site map and note the locations where different eco-services are provided.

**Discussion/Assessment:**

Who are the Garden Earth Department Managers?

What eco-services are provided on your school site?

# Garden Earth Naturalist

## DAILY LOG

**Date:** *Monday morning*  
**Location:** *School site, Planet Earth*  
**Topic:** *Eco-service Workers: Hard at Work on our School Site*

**6am** The owls had a busy night eating field mice from the sports field and the bats are settling down from a nighttime feast of mosquitoes. The goldfinches and cardinals are ready for breakfast and begin to eat at a site called the Schoolyard Café. Madame Squirrel and her workers are making sure that all of the animals at the school site have food. The **Food Production Department** is a busy place at 6am and throughout the day. *Place a **red bead** on your string.*

**8am** Old Man Spruce's tree workers and all the other green plants on the school site are breathing in dust and carbon dioxide gas and breathing out oxygen and clean air. They work all day long cleaning the air and providing important gases that the animals need to survive. Old Man Spruce refers to all the green plants as hard workers in the **Air Cleaning Department**. *Place a **green bead** on your string.*

**10am** Ms. Mantis and her workers are busy keeping insect pests and plant diseases from invading their site. Ms. Mantis is eating a variety of insect pests and her ladybug helpers are feasting on aphids in the vegetable garden. They worry about the fire ant pests and invasive plants on the site; especially the kudzu from China. The **Pest and Disease Control Department** is kept very busy on the school site. *Place a **black bead** on your string.*

**12 pm** The kids at the school planted lots of flowers near their classrooms. At the far end of the playground a variety of wildflowers are growing. The bees, butterflies, beetles, wasps and flies are carrying pollen from flower to flower. It is very important that these pollinators report to work each day since their work is vital to the production of fruits and seeds. *Place a **yellow bead** on your string for the **Pollination Department**.*

**2pm** At 2pm it is very hot on the school site. The trees help to control the temperatures on the site. Some kids are sitting under the trees doing an art project. It is nearly 20 degrees cooler in the shade of the trees! Without trees and forests, earth would be much hotter and drier. The **Climate Control**

**Department** provides a very important service on planet Earth. *Place an **orange bead** on your string.*

**4pm** Down in the soil a variety of eco-service workers are hard at work. The earthworms and beetles are chewing on fallen leaves and branches as well as on animal waste and are changing them into soil that is needed by the plants in the food, air and pollination departments. If it wasn't for the workers in the **Soil Department**, Earth would be covered with dead wood, leaves, animal corpses, and animal poop! *Place a **brown bead** on your string.*

**6pm** An early evening storm floods the school site! As the water falls from the clouds, it seeps into the ground and is cleaned of naturally occurring pollutants before seeping into the nearby stream. The fish, turtles and frogs are happy that the school site ecosystem has a natural way to clean water on the site. The **Water Purification Department** is important to the workers in all the Garden Earth Departments. *Place a **blue bead** on your string.*

**8pm** The school site contains an amazing number and variety of plants and animals. Over the years, children at the school have planted numerous plants that provide homes for a variety of animals so the biodiversity of the school site is increasing. Luckily, there are a number of plants that can be used for medicine, food and clothing; other plants produce wood that can be used for houses, paper, musical instruments. This variety of useful plants and animals makes up the school site **Biodiversity Department**. *Place a **purple bead** on your string.*

