

Energy and Ecosystems: Part 1

In our first energy series, we're going to look at **ecosystems**. Last week we asked you to reflect on what your students understand about this concept. Characteristics of ecosystems include:

- An **ecosystem** is composed of "interacting...parts"¹ that comprise a whole.
- **Ecosystems** consist of living and nonliving elements.
- **Ecosystems** are open; "energy and matter are transferred in and out."¹

Ecosystems encompass such areas as deserts, woodlands, oceans, or jungles.

The study of energy in **ecosystems** is important, yet it is complicated because of the above characteristics. Energy can leave and enter the system, and no part of the system should be considered in isolation. Therefore, assessing students' understanding of energy in **ecosystems** is complicated, too. It's not enough to understand the various components of the system; students must understand how the system functions as a unit. We're going to examine students' understanding of energy as a part of ecosystems. Additionally, we'll study an assessment item that asks the reader to analyze changes within part of an **ecosystem**:

Sample assessment item

An ecologist is studying a woodlands **ecosystem**. In the first year of her study, she records her observations of the energy flow within one geographic section of the **ecosystem**. After observing the numbers of different organisms, she plans to make inferences about the energy flow. The first diagram shows the organisms she observes and the number of organisms of each kind. Two years later she takes a second set of readings and records them in the second diagram.

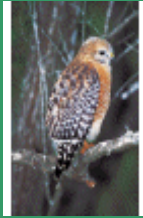
1. What are the changes in the part of the ecosystem shown in the diagrams?
2. How might the ecologist explain the changes?

3. What data would the ecologist need to collect to verify her explanation?

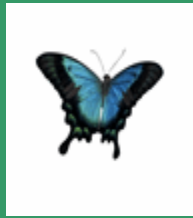
Diagram 1



**Flowering (50)
plant**



Bird (20)



Butterfly (30)



Fox (5)



Fern (100)



Rabbit (50)

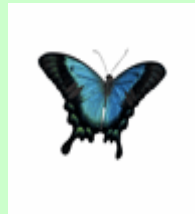
Diagram 2: Two years later



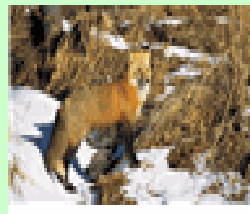
**Flowering (50)
plant**



Bird (20)



Butterfly (30)



Fox (3)



Fern (50)



Rabbit (35)

(This particular example may not be appropriate for your grade level, but it can be easily adapted. For instance, use fewer species of organisms, or reduce the number of organisms within each species.)

Coming up

We'll use the remaining energy and **ecosystems** e-mails to deconstruct this **ecosystem** assessment item. Next week we'll discuss the scientific definition of energy as it applies to ecosystems.

In the meantime, we'd love to hear about any conclusions that can be drawn from this assessment item, either by yourself or by your students.

<mailto:crsep@schenectady.k12.ny.us>

What do the New York State standards say?

In the Elementary Core Curriculum, Standard 4, The Living Environment,

Major Understandings state:

- 6.1c Animals that eat plants for food may in turn become food for other animals. This sequence is called a food chain.
- 6.2 d The Sun's energy is transferred on Earth from plants to animals through the food chain

In the Intermediate Core Curriculum, Standard 4, The Living Environment,

Major Understandings state:

- 6.1a Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids.
- 6.1b Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.

¹http://capita.wustl.edu/ME567_Informatics/concepts/ecosys.html