TITLE Map That Ecosystem GRADE(s) K-5

TIME REQUIRED 1-2 class periods

CONCEPT STATEMENT

Students will investigate a variety of ecosystems and explore the changes that may occur in them over time by making aerial-view maps of their school's campus (or other location).

OBJECTIVES

Students will: identify the living and non-living elements of various ecosystems; describe the kinds of plants and animals each ecosystem might support; create labeled aerial maps that reflect their discoveries; and explain their projects to the class.

STANDARDS OF LEARNING CORRELATIONS

Science: K.4, K.5, K.6, K.7, K.10, 1.4, 1.5, 2.5, 2.7, 2.8, 3.5, 3.6, 3.10, 4.5, 4.9

Visual Arts: K.2, K.3, K.5, K.7, K.8, K.9, K.10, K.12, K.15, K.16, K.18, 1.1, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.10, 1.13, 1.16, 1.17, 1.20, 2.1, 2.4, 2.5, 2.7, 2.8, 2.9, 2.18, 3.2, 3.3, 3.4, 3.5, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 5.1, 5.3, 5.5, 5.6, 5.11, 5.25

English: K.2, K.3, K.6, K.8, K.10, K.11, K.12, 1.2, 1.3 1.5, 1.8, 1.12, 1.13, 2.2, 2.3, 2.10, 2.11, 2.12, 2.13, 3.1, 3.7, 3.8, 3.9, 3.10, 3.11, 4.1, 4.2, 4.7, 4.8, 5.1, 5.2, 5.7, 5.8

MATERIALS

1 large sheet (24" x 36" is suggested) of heavy paper per student group
1 ruler per group
1 flat surface large enough to accommodate the big sheets of paper
drawing pencils, markers, crayons, colored pencils, erasers
inexpensive paper for preliminary sketches
glue in small bottles and glue sticks
scissors
collage materials (pictures from magazines or internet, cut-out shapes, colored tissue paper, stamps and ink pads, etc.)

VOCABULARY

aquatic ecosystem, terrestrial ecosystems
population, community
aerial map, satellite image

OVERVIEW (List VMFA resources and other resources used)

Begin this activity by showing students the two works of art from the VMFA collection listed below. Adapt concepts and vocabulary to the appropriate grade level.

The first, Grey Day on the Charles, shows a freshwater aquatic ecosystem. Artist John Breck painted this picture of a peaceful river setting near Boston, Massachusetts, in 1894.

Grey Day on the Charles, 1894, by John Leslie Breck (American, 1860–1899)
http://www.vmfa.state.va.us/Collections/American_Art/Painting,_Sculpture,_and_Works_on_Paper/Breck,_John_Leslie_90_151.aspx

Ask students to name or describe the kinds of plants they notice in the painting (water lilies, reeds, bushes, trees). Ask them to name some of the animals that might live in the river (fish, frogs, eels). Continue with a class discussion relating to the following concepts and definitions:

An aquatic ecosystem is a water-related area and the plants and animals it supports. An aquatic ecosystem can contain either fresh water or salt water. This image is of a fresh water river.

A population is a group of organisms of the same kind that lives in the same place.

Ask students if they can think of populations that might live in this ecosystem (fish, insects, ducks, etc.). Continue by adding that a community is all of the populations that live together in the same place. Discuss the community that might live in this area.

End this part of the discussion by considering how water gets into the Charles River. Explain the concept of a watershed. Ask what might happen to the river over time.

Farm Scene in Winter, 1802, by William Williams (British, dates unknown),
http://www.vmfa.state.va.us/Collections/European_Art/Painting,_Sculpture_+_Works_on_Paper/Williams,_William_85_479_2_Farm_Scene_in_Winter.aspx

The second picture, Farm Scene in Winter, by William Williams, shows a terrestrial ecosystem. Explain that this type of ecosystem contains a system of plants, animals, nutrients, and elements, and the interactions between them, that is found on the land.

Ask the students to name some of the populations that might live in this ecosystem (cows, pigs, chickens, dogs, rabbits, mice, humans, etc.). Next, ask them to describe the community interactions. Include discussion of what each population needs to survive.

Also ask them to think about the impact that humans have had on this ecosystem.

End the discussion by introducing the concept of an aerial map. Ask them to imagine what they might see if they could fly over this farm. This kind of map might include rivers, forests, meadows, trees, buildings, etc. Explain that satellites (machines placed in orbit around the earth that can collect information) can now take this kind of image anywhere in the world!

Here's a good elementary level reference for making topographical maps:
http://www.ehow.com/print/how_4926439_draw-topographical-map.html

ACTIVITY DIRECTIONS

After the class discussions, tell students that they will make their own aerial maps using a satellite image.

Teacher instructions: Using an on-line satellite imaging site (http://www.satelliteviews.net/my-house.htm), find a satellite view of your school campus or other location. (Satellite view will include roads and buildings as well as wooded areas and water.)

Copy and paste the image into a Word document and adjust the image size to 4" x 6". Make a copy for each group. Divide the class into groups of 4 to 5 students. Give each group a copy of the aerial view, a sheet (24" x 36") of heavy paper, a pencil, and a ruler.

Give the groups the directions below.
(With younger classes, make the large-scale map as a whole-class project with the discussion emphasis on living organisms and nonliving objects, etc.)

1. Grid the satellite image using 1-inch squares. Grid the large sheet of paper using 6-inch squares.
2. Transfer the outlines of landscape, buildings, streams, etc., of each square from the smaller map to the larger map so that you end up with a fairly accurate larger scale representation of your chosen location.

Class discussion: Talk about how the mapped area might have changed over time. What might it have been like if no humans or animals had lived in the area? Let the class decide if there are streams, ponds, etc. When it rains, where would the water collect? What kind of soil and plants does the area have? What do plants need to survive? Does the area have seasons? Where might erosion occur?

Once the discussion is finished, pass out the rest of the materials to each group. Tell the students that they may use magazine pictures, drawings, cut-outs, stamps, etc. to make their maps.

Continue with these instructions:

3. Now imagine a particular ecosystem, but without animals. After sketching out your ideas, make a collage that shows the features of your ecological setting, including water features, high ground, low ground, forested areas, meadows, etc. Make sure to design a map key to help viewers read the map. Finish your project by writing a description of the area you have designed. Finally, make a plan for presenting the project to the class.

Concluding activity: Once the students have explored their mapped areas, make them true ecosystems by introducing various animal species. How will that change their maps? What do animals need to live? Describe predator-prey relationships; producers, consumers, and decomposers; and food webs that might exist in this ecosystem. What will happen to the land and the ecosystem over time?

(Choose which of these questions to address depending on the grade level of your class. The VMFA lesson plan called The Animal Slam: Amazing Adaptations was designed to follow this activity.)