A Bed of Biodiversity [ME]

Adapted from Virginia Department of Environmental Quality

Grades: 6-8
Time: 45 minutes to 1 hour

Goals: To create models to distinguish between eelgrass beds and a forest floor.

Objectives:
Students will be able to: define key characteristics of two plant-dominated ecosystems; define biodiversity; create models to describe the two ecosystems; and understand the importance of eelgrass beds in relation to biodiversity.

Materials:

Two large plastic tubs (per group)
Topsoil
Sand
Water
Washers (or weighted bolts)
Brown pipe cleaners
Green ribbon
Scissors
Photographs of species found in each ecosystem (laminated)
One-hole punch

Preparation: Located in this manual, you will find species found in and around an eelgrass bed. Provided with this lesson, you will find species found on a forest floor. Prepare these photos by laminating them and punching a hole in each. You can also use the option of handing the laminated photos to the students to hole-punch them as part of the lesson.

Procedures:

1. Pre-Activity (introduction): Begin by asking the students if they've ever been to the woods or a forest. Have they taken notice to how the plants are different from the canopy to the forest floor? What makes these plants different from each other? Continue the discussion on the requirements of plants to survive and whether the requirements are different between the plants at the canopy and those at the forest floor. List these requirements out on the board. Compare these requirements and this ecosystem to other like ecosystems such as a maritime forest and eelgrass beds. Are the requirements and conditions the same or are they different?

2. Activity: Divide the class into working groups of 3-4 students and pass out the materials to each group. They should each have two large plastic bins, a set of laminated photos for both ecosystems, pipe cleaners, washers, and green ribbon. The pipe cleaners will represent the stems of the plants, the washers are the roots, and the green ribbon is the leaves. Instruct the students on how to attach one end of the pipe cleaners to the washers and then add pieces of green ribbon to the other end. For the plants of the forest floor, make sure they understand that plant leaves are either found with alternating leaves down the stem or opposite leaves. For the plants of the eelgrass bed, there is no distinct pattern and some plant stems will have different numbers of leaves than others.

   To construct their model ecosystems, first add the soil – topsoil for the forest floor and sandy soil for the eelgrass beds. Make sure the soil fills the bin halfway to the top for the forest floor and a quarter for the sand. Next, have them root their plants into the soil. Forest floors are usually very dense, while eelgrass beds can cover more area if the plants are sparser. They can even create bundles of plants together for eelgrass beds. Have the students "plant" the roots into the soil, again paying attention to how far apart or how close together they are planting. Add water according to the requirements of the ecosystem. Distribute the biodiversity cards and have them attach the cards to pipe cleaners to place around the ecosystem.

3. Post-Activity (review): Discuss biodiversity in terms of number of phyla and species and distribution throughout the ecosystems they created models for. Students will have to decide which ecosystem contains more biodiversity of species and possible natural and anthropologic inhibitors to growth and continued biodiversity of both ecosystems.

Key Words:

Biodiversity	Ecosystem	Eelgrass beds
Submerged aquatic vegetation	Undergrowth	Fronds
Substrate	Terrestrial	Salt marsh
Densely populated		

Background Information:

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Similar to flowering, vascular plants on land, submerged aquatic vegetation (SAV) grow the same way, just underwater. Usually surviving best in shallow water conditions, they are an excellent source of oxygen as well as a habitat for juvenile species of fish and invertebrates (photos of these are found throughout the manual). Their presence in the water is also a great indicator of the general health of an estuarine ecosystem because they help improve water quality by filtering out pollutants from runoff. Because of this high biodiversity, they are often equated to a lowland forest.

While underwater, their stalks and roots assist in settling out sediments in the water column, similar to the way dune plants will capture and hold sand that is wind swept or pushed by storm surges. When there is an overabundance of nitrogen and phosphorus in the water, due to heavy runoff from fertilizers, their roots can withstand these nutrients so that the surrounding water does not become polluted. Without submerged vegetation, the influx of nutrients could lead to severe algal blooms and eutrophication.

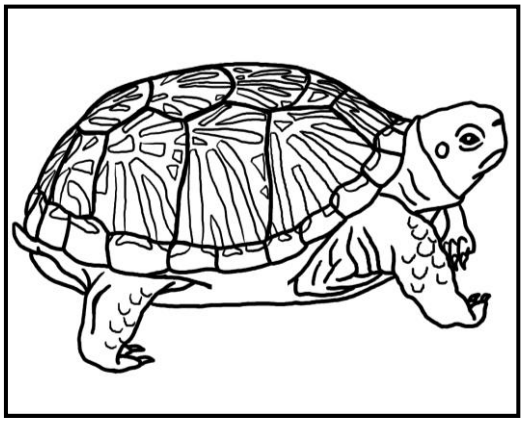
In New Jersey, for example, there are eel grasses that create a very prolific ecosystem in the Barnegat and Delaware Bays. These eel grasses have unfortunately declined in number since the 1950s due to the increase in pollutants from development and runoff as well as more grasses being caught in the propeller blades of recreational boaters. These issues, as well as other competing vegetation, have become the topic of many debates in order to halt the decline of these vital submerged plants.

Forest Floor Biodiversity of Species

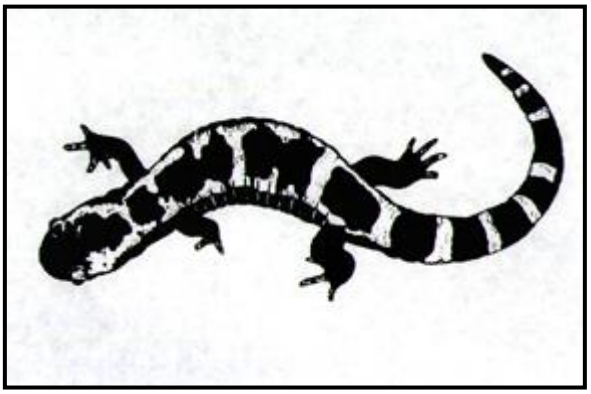
Timber Rattlesnake

Treefrog

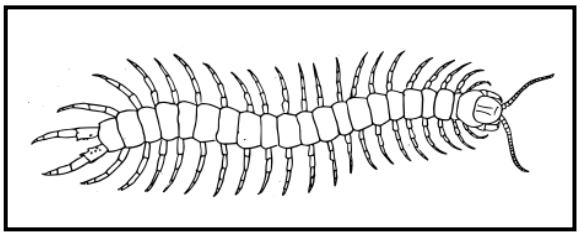
Box Turtle



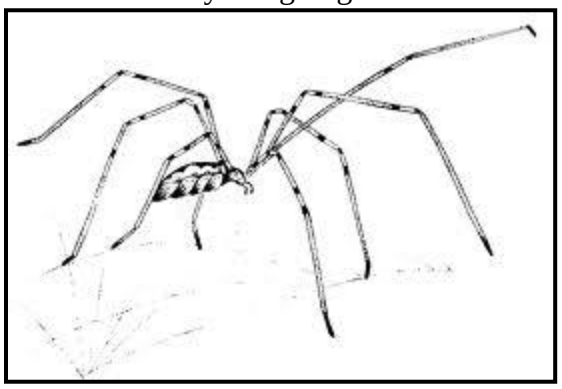
Marbled Salamander



Centipede

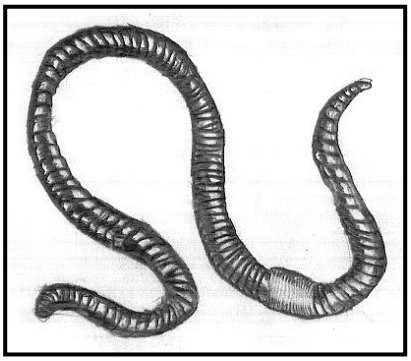


Daddy Long Legs



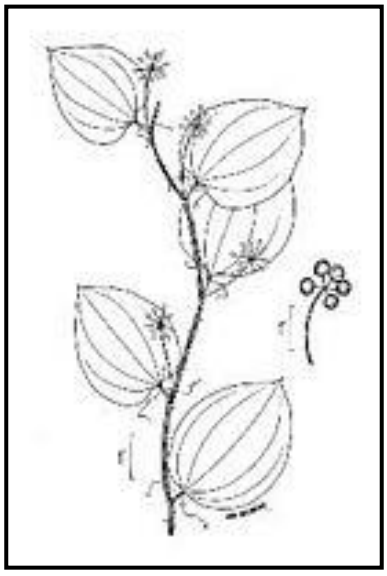
Pill Bug

Earthworm



Wolf Spider

Catbriar



Ferns

Prickly Pear Cactus