



# Forest Biodiversity Cube

## LESSON

**GRADE LEVEL** K-7

**CATEGORY** Plants, Animals and Habitats

**TOPIC** Earth, Ecosystems and Ecology

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## TIME

45 minutes

## MATERIALS

- Tempera paints and brushes
- Pencil crayons, wax crayons
- Diversity Cube pattern sheet
- Clipboards or other hard surface
- Glue, paper, and pencils

## SETTING

Indoors and outdoors (early fall, late spring or summer)

## GROUP SIZE

Small groups or individuals

## SUBJECTS

Science, Math, Language Arts, Art

## SKILLS

Classification, measuring comparing, contrasting, evaluating, interpreting, drawing, and observing

## KEYWORDS

Biodiversity, genetic diversity, ecosystems, species diversity, plants and trees

## Overview

Students illustrate species, genetic and ecosystem diversity of a forest's plants and trees through art.

## Objectives

Students will be able to:

- understand the difference between species, genetic and ecosystem diversity
- explore the different components of biodiversity in their local forest

## Background

Biodiversity is life in all its forms and the habitat and natural processes that support it. There are three important concepts related to biodiversity: species, genetic and ecosystem diversity.

### Species Diversity

Species diversity is a group of plants or animals that are more or less alike and that are able to breed and produce fertile offspring under natural conditions. For example, all breeds of domesticated dogs are members of the same species as are cats. And if you add other domesticated species (such as horse, cow, etc) you are then listing species diversity of domesticated animals.

One way of evaluating and describing the biodiversity of an area is to measure the number of different types of living things: the species diversity. Species biodiversity is also a factor of an area's climate, geography and history.

### Genetic Diversity

Genetic diversity refers to the difference in Genes which carry the genetic code inherited from parents of the living thing be it plant, animal or virus. Genes affect how an organism look and behave and is often what we are talking about when looking at an individual's differences from every other individual of its species. In humans, genetic diversity may appear as colour differences (e.g. eye colour or hair colour), size differences (big feet/ small feet), or behavioral differences. Or it may exist in less obvious forms inside our bodies, affecting the way we grow, think and resist disease, for example. Genetic diversity exists in all species and is very important to the ongoing health of each species because species with high genetic diversity can adapt better to changing conditions in their environment.

## Ecosystem Diversity

Ecosystem diversity describes the variety of different natural systems found in a region, in a country and on the planet. An ecosystem consists of all the living and nonliving things in a given area that interact with one another. An ecosystem can be as tiny as a drop of pond water or a square metre of a garden. Or it can be as large as an ocean, a forest or a desert. Ecosystem diversity is a function of its biotic (living) species diversity and its abiotic (non living) components such as geography, climate, gases, soil and water resulting in the myriad of different ecosystems on Earth.

## Procedure

### Warm up

1. To begin this activity the students need to have an understanding of what biodiversity means. Shoes can be used to introduce the levels of biodiversity. Ecosystem diversity in shoes would be Athletic shoes, Work, Dress and Casual shoes. Species diversity in the "ecosystem" Athletic shoes could be running, tennis, baseball, golf, dancing, swimming shoes, etc. Finally, genetic diversity in the "species" running shoes could include Nike, Adidas and New Balance, etc.
2. Or if you do not want to use an abstract analogy, you can easily discuss genetic diversity in the difference between dogs or cats such as size, colour of hair, eye colour, etc. And species diversity by discussing all the different types of domesticated animals.

### The Activity

1. Take students outside to a forest where there is a mixture of trees and different types of plants and trees.
2. Square #1 is filled with a drawing of the scene made by students holding their hands straight out in front of them with their index and thumbs fingers extended and the thumb tips touching to make a frame.
3. Using the same scene from the first square, students should find at least 2 plant species such as a maple tree and a salal plant. These two plants should be drawn in square #2 and square #4 for species diversity. On square #3 and #5 have the students write a short poem or description about the species they drew in square 2 and 4.
4. On square #6 students should make leaf prints of three different leaves of the same species of plant or tree. Younger students can make rubbings or drawings on all or the remaining squares.

5. Put the "Diversity Cube" together. Cut along the solid lines and fold along the dotted lines. Then glue the flaps and allow to dry.
6. The cubes can be hung up or kept loose to use as a further teaching tool.

### Notes for the activity

- The "Diversity Cube" template will need to be enlarged (2x) from 8 1/2" x 11" to 11" x 17". Older students should be able to do this themselves on larger sheets of paper using math and graphing skills.
- Leaf rubbings can be taken carefully from living plants or students could use fallen leaves and then compost them afterward.

### Notes on using leaves in art projects

To make leaf rubbings:

- choose a leaf
- lay it upside down on a hard surface
- position one of the squares of the "Diversity Cube" over the leaf and rub evenly over the leaf using the side of a wax crayon

Start softly and apply more pressure as needed. The shape of the leaf and the veins will gradually emerge.

To make leaf prints:

(Make these last so the paint won't be smeared)

- choose a leaf (leaves with large veins or ribs work the best) and paint one side with tempera paint
- Press the leaf carefully onto one of the cube sides. After a few seconds, peel the leaf away. The shape of the leaf will be painted onto the paper.

Repeat with different leaves and colours if desired.

It is a good idea to do a couple of practice leaf prints on a piece of paper before you try it on your cube.



## Evaluation

1. How can different individuals of the same plant species be different?
2. Explain some of the things that make up Ecosystem diversity?
3. Evaluate understanding displayed in the art cubes.
4. Discuss how the class could extend the activity, see 2 under Extensions. What would the students draw on each of the sides of the cube if there was one (1) art cube for each level of biodiversity? Which diversity level would they use for the largest cube, the smallest and in the middle and why?

## Extensions

1. Have your students think up as many adjectives as they can to describe the leaves used in the activity. Have them think up a pseudonym or a poem for remembering tree traits, for example, "Spruce's short stiff spikes are stuck on singly." Display these on poster board with one of the leaf samples and/or a drawing of the tree.
2. Repeat the activity using three different sizes of cubes and the guidelines from the class discussion. Try making nested cubes by leaving one side open in the two largest cubes so each size can fit into the other. Or use the completed cubes to make a diversity art sculpture or wall hanging mobile to demonstrate the diversity of the forest they visited at all three levels.
3. Put the completed "Diversity Cubes" on the floor. Have students: "Find a leaf that looks like your hand," or "Find a leaf with smooth edges." Bring in leaves from outside and have them find a leaf print or rubbing that is similar, based on size, shape, leaf margin or some other characteristic.
4. Use the cubes for counting exercises or for sorting things into sets (e.g. ordering leaves from the smallest to the largest).

## Resources

Tree Book Learning To Recognize Trees of British Columbia  
Ministry of Forests. Copies available from:

### Wild BC

PO Box 9354 STN PROV GOVT  
Victoria BC V8W 9M1

Phone: (250) 356-7111 or toll free 1-800-387-9853

also available for purchase online: <http://hctfeducation.ca>

## References

1996 Northwest Territories Department of Renewable Resources. Adapted with permission from NWT's Focus on Forests, "Leafy Cubes."

Backyard Biodiversity and Beyond's "Biodiversity Means Differences". 1995. Ministry of Environment, Land and Parks.

