



# Levels of Biological Diversity

## Materials:

- ☆ Information sheet on levels of biological diversity and biological diversity levels chart.

## Rationale

Levels of biological diversity occur from the genetic level to that of the biosphere.

## Objectives

1. Students will compare the biological diversity of Arkansas from micro to macro levels.
  2. Students will compare the biological diversity of Arkansas with that of a tropical rainforest and of a desert at the ecosystem, species and genetic levels.
  3. Students will compare environmental specialists and environmental generalists.
3. Discuss the following question: For each level of biological diversity (ecosystem, species, genetic), how does Arkansas compare with the desert? With a tropical rainforest?
  4. Brainstorm as many common and uncommon species of plants and animals as possible. Divide these organisms into those that live in Arkansas and those that do not.
  5. Choose one common organism and one uncommon organism. Compare and contrast these two species according to the following criteria: genetic variety; habitat; food; number and survival rate of offspring; tolerance for environmental conditions such as temperature, humidity, pH, dissolved oxygen (DO), available space, etc.
  6. Have students discuss the definitions for an environmental generalist and an environmental specialist. Of common and uncommon species, which is more likely to be a generalist and which a specialist? How does this tend to affect their niche, their numbers and their lifestyle or behavior? Which is more likely to be impacted by human activity? Explain your answers.

## Procedure

1. Have students read and discuss the student/teacher information sheet and chart on levels of biological diversity.
2. Have students (in small groups), construct similar charts for each of the natural divisions of Arkansas

## Extensions

Research a common Arkansas organism. From your research, determine if this organism could live anywhere in Arkansas or if it would be restricted by its needs to a certain area. Could it live anywhere else in the world? Do the same for a rare/endangered Arkansas organism.

### ***Correlation to National Science Standards***

Unifying Concepts and Unifying Processes  
Life Science

### ***Correlation to Arkansas Frameworks***

Science: LS.2.4, LS.2.13, LS.2.18, LS.3.7, ES.2.3, ES.2.10, ES.3.7

## ***Levels of Biological Diversity***

A species is considered to be the basic unit of biological classification, and the ecosystem is the basic unit of ecology. There is some disagreement over the exact definition of a species, but most scientists agree that a species is composed of related individuals of a common type, having recent common ancestry and sharing an ecological niche. Sexual organisms must be reproductively isolated, not interbreeding with any other group, to be defined as a species. An ecosystem includes all of the species in an area, along with the nonliving factors that affect the species and populations within that area (soil, water, climate, etc.).

Biodiversity is the total diversity of all living things. This includes all animals, plants, fungi, protists and bacteria; their ecological role or niche; and their gene pools. Taking these things into consideration, we can look at the biodiversity of a system on three levels: ecosystem diversity, species diversity and genetic diversity. Genetic diversity comes from the cellular DNA that carries the code for every trait of every organism. The basic unit of heredity is a gene (a DNA segment that carries the code for a particular trait or process). Genes for a trait come in more than one form (alleles), so that the combining of different alleles can create genetic diversity among individuals of a species and between different populations of a species. Variety in ecosystems results in selection for different traits, making the environment the driving force of natural selection and mutations its raw material. Earth's biomes and ecosystems vary a great deal in their degree of diversity. Tropical rainforests support about 50% of all the earth's species, but they cover only 14% of earth's surface area. This is the reason the tropical rainforest is the most biologically diverse ecosystem on earth.

### **Arkansas**

<b>ECOSYSTEM DIVISION</b>	Mixed Hardwood	Prairie	Southern Pine
	Vacant Lot	River	Pond
	Swamp	North Facing Mountain Slope	

<b>SPECIES DIVISION</b>	White Footed Mouse	Prairie King Snake	Ornate Box Turtle
	Burrowing Owl	Mole Cricket	Toad
	Broom Sedge	Big Bluestem Grass	

<b>GENETIC DIVISION</b>	Allele for melanin production normal color	Allele for development of large forelegs
	Allele causing nonproduction Of melanin-albino	Allele for dwarf forelegs
	<b>COMMON SPECIES</b>	<b>UNCOMMON SPECIES</b>

