Biodiversity from Sea to Shining Sea

A look at biodiversity among the fifty states

Skill Level
Intermediate -Advanced

Learner Outcomes
The learner will be able to:
- *Define biodiversity and describe influencers.*
- *Relate quantitative spatial data.*
- *Use ranking to determine an answer.*

Educational Standard(s) Supported

Success Indicator
Learners will be successful if they:
- *Can create and interpret a heat map.*
- *Can compare their hypothesis to reported study results.*

Time Needed
45 minutes – 1 hour

Materials List
US Map with labeled biodiversity
Dry Erase Markers
Student Handout
Coloring Pencils

Optional:
State Animal, Plant Flashcards
Push Pins

Introduction to Content

Biodiversity is all around us, no matter where we are in Tennessee, in the United States, or on earth. This module will introduce the concept of biodiversity, discuss influences on biodiversity, and use a ranking of all 50 states biodiversity to explore differences across the country.

Introduction to Methodology

This introduces the three main factors that positively and negatively influences biodiversity, then students interpret spatial information to make a hypothesis, create a heat map of biodiversity from data presented, and determine if their hypothesis was correct.

Author
Andrea Ludwig
Associate Professor of Ecological Engineering
Biosystems Engineering & Soil Science Dept.
University of Tennessee

Prepared using research based practices in youth development and experiential learning.

Terms and Concepts Introduction

Biodiversity – the variety of life on earth or in a particular habitat or ecosystem.

Ecosystem – a biological community of interacting organisms and their physical environment.

Species Diversity – number of species and abundance of each species that live in a particular location.

Tips for Engagement

Ask students for their favorite plant and animal. Where have they seen them? In nature or in a zoo?

Bring in information on local rare or endangered species.

Setting the Stage and Opening Questions

Scientists estimate that there are around 8.7 million species of plants and animals in existence, but only around 1.2 million have been identified and described so far. That means there are millions of organisms waiting to be discovered.

Ask student to define biodiversity. What influences biodiversity (both positively and negatively)? Where is biodiversity high (geographically or locally)? Where is it low? Would a parking lot have higher biodiversity than the local park? How about the Smoky Mountains or the school yard? Why?

Experience

Students will use handout #1 and the slide set to make a hypothesis of the top five most biodiverse states. Share the maps of ecosystems and climate with the group. Students will use the blank map to make notes of which parts of the country appear to show characteristics that would positively influence biodiversity. Also remind students of factors that could contribute to biodiversity loss. Students should complete their hypotheses on the handout.

Students will work in groups to complete the mapping activity. Divide into groups of 3-5, depending on how many maps are available. Each group should have one large map and dry erase markers. Pass out handout #2 to each individual. Groups should identify state names on the large poster and can begin to rank states with the highest biodiversity. Then, students will make a biodiversity heat map. This can be done individually on the handout with coloring pencils or as a group on a laminated map using dry erase makers. Begin with high biodiversity states in a "hot" color of red and move through the rainbow to a "cold" color of purple for states with lowest biodiversity. Students should use the legend color key to color in states with the color that matches the biodiversity range in which they fall: Red greater than 5501, Orange 4501-5500, Yellow 3701-4500, Green 3001-3700, Blue 2201-3000, and Purple less than 2200. Once colors are completed, the heat map should reveal biodiversity hotspot areas across the country. Ask the students to share their maps (which should all be the same). Students then can use the biodiversity data on the map to rank the top five biodiversity states and compare to their hypothesized list. The top five states are #1 California, #2 Texas, #3 Arizona, #4 New Mexico, and #5 Alabama.

How does Tennessee rank? It ranks 13th among all states in biodiversity.

Share

Ask for volunteers to share their comparison between their hypothesized list and the rank list created from the map data. How many states did they hypothesize correctly?

Process

The activity explored biodiversity of the United States, but what about at the global scale? Here are the top counties with the highest biodiversity:
#10 (tie) United States and Venezuela
#9 Ecuador
#8 India
#7 Australia
#6 Peru
#5 Mexico
#4 China
#3 Indonesia
#2 Colombia
#1 Brazil

Apply

Ask the student to complete the last two questions on the handout: "What are some causes of biodiversity loss?"

Answers include, but aren't limited to: human consumption, human population growth, illegal wildlife hunting/trade, over-exploitation, fragmentation, habitat loss, land use change, pollution, invasive species, climate change. Brainstorm as a group on the question "What can be done to protect biodiversity?"

Other notable observations from the report are listed below – note Tennessee ranked in top five for Amphibian and Fish diversity.

Rank	Diversity	Risk	Plants	Mammals	Birds	Amphibians	Fishes
1	California	Hawaii	California	California	Texas	North Carolina	Alabama
2	Texas	California	Texas	Texas	New Mexico	Georgia	Tennessee
3	Arizona	Nevada	Arizona	New Mexico	Arizona	Virginia	Georgia
4	New Mexico	Alabama	New Mexico	Oregon	California	Tennessee	Kentucky
5	Alabama	Utah	Oregon	Arizona	Florida	Texas	Mississippi

Go Further

Each of the United States has a set of official state symbols, including an official flower, bird, and mammal. Explore these symbols and how they may depict unique climate, habitat, and ecosystems of the states.

Life Skill(s)

Sources

Top Biodiversity Countries: Mongabay.com

Stein BA. 2002 States of the Union: Ranking America's Biodiversity. Arlington, Virginia: NatureServe.

State Symbols: Statesymbolsusa.org

Bingo card generator: Bingobaker.com

Supplemental Information
Educational Standards Met

6th Grade

7th Grade

8th Grade