RAINDROPS KEEP FALLING ON MY HEAD – RAINFALL VARIATION ACROSS THE STATE OF TENNESSEE

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TENNESSEE WATER STEM EDUCATION PROJECT

Grade Level: 5-8
Time Needed: 30-45 minutes
Suggested Delivery Modality: Classroom or Self-guided
Materials: Color printed handout or projector, rulers/yardsticks or measuring tapes, masking tape or chalk, rain gauge (optional), internet access (optional)

Learning Objectives:
After completion of this activity, students will be able to:
- Use new terms related to rainfall and weather.
- Describe rainfall patterns in Tennessee.
- Read a heat map and use reasoning skills to determine an estimate.

Standards Met:

Background
The state of Tennessee crosses land of varying elevation, which includes differences in average annual rainfall, as well as different weather on a given day. The University of Tennessee has rainfall information for areas all over the state. Comparing your location to others in the state can convince you that rainfall does not affect all of us equally.

Start by searching for these facts:

- Annual average rainfall for the state of Tennessee
- Locate their home county on the rainfall map for Tennessee
Raindrops Keep Falling On My Head – Rainfall Variation Across the State of Tennessee

- Annual average rainfall for their county in Tennessee
- Compare their county to the highest and lowest rainfall counties in Tennessee
- Discuss rainfall terms: drought, flood, average

Vocabulary Terms

**Average annual rainfall:** the amount of rain naturally falling in one year measured in inches, averaged for a span of several years

**Drought:** a time of low rainfall, resulting in dry soil and low water levels in streams/ponds

**Flood:** a time of high rainfall, somewhat rapidly, resulting in streams overflowing the banks so that water volume causes water to rise over roadways, fields and towns

**Climate:** general term for temperature and rainfall of a region over a few years

**Weather:** local temperature and precipitation for a specific small area on a given day

Start the Conversation

This activity may be used with 4-H camp, 4-H meetings and home schooling. Here are some suggested questions to start discussion and generate interest:

*When was the last time it rained here? What was the amount of rainfall?*

Students’ answers will vary according to location. Explain that the reported amount of rainfall is recorded by a weather station, which may be located at an airport or other official site. Schools and homes may also have rain gauges to collect more localized rainfall information, but these must be monitored and emptied as needed to capture accurate totals over a known time period.

*Think about rainfall during the year. Are there times when we get less rain? When?*

Student answers will vary. Generally, the driest months are in the late summer and early fall. Drought is a time of low to no rainfall, when soil becomes dry. Discuss how a drought affects plant growth and water availability for wildlife and livestock.

*Are there times when we get a lot of rain? When? What is the result of rapid heavy rainfall?*

Generally, the wettest months are in winter and spring in Tennessee. Ask if students have seen flooding on the news on television or internet. Group may discuss places where buildings and roads are damaged by flood waters.

Reinforce the difference between climate and weather. Climate covers a large area and is a general or average condition. Weather is the condition at a specific location and can include elements like temperature and precipitation on a given day or week. For example: How is the weather where you are today? What is the climate where your family is from in Michigan?
**Activity**

In a group or classroom setting, use a handout or a projector to show students the rainfall information for the state of Tennessee (Figure 2). County boundaries are included on the map as well as average annual rainfall lines – these lines are more curvilinear. Information for individual cities can be found in the other resource links.

The map displays average annual precipitation trends across Tennessee. Each color represents a different range of annual rainfall in the units of inches per year (see map legend). Ask students to determine the range of average annual rainfall across the state by looking at the map (41-81 inches per year). Ask students to identify the counties with areas of highest rainfall. Ask students to identify the counties with areas of lowest rainfall. Ask students to identify other counties with large variability in average annual rainfall. What did they look for on the map to make that determination (looked for areas with multiple colors close together)? Ask students to identify counties with consistent average annual rainfall. What did they look for then (counties that are all the same color)? Ask students what factor in the landscape could be affecting rainfall patterns based on the patterns seen on this map. Note that in areas of high rainfall variability, there is also variation in topography in the Smoky Mountains, Highland Rim and Cumberland Plateau.

Divide the class into groups so there are 3-5 groups. Assign each group a set of counties to compare from below. Students are to 1) determine the range of average annual rainfall in the county by evaluating the data presented on the map, and 2) use a ruler/yardstick/measuring tape to measure these heights on a chalkboard or against a wall and mark with chalk or masking tape (label with county name). Each county should have a range indicated with a lower bounds and upper bounds. Students may need assistance in reaching heights of highest measurement. After groups have done their measurements, ask a representative from each group to share their findings with the class, finding each county on the map and then referencing the markings on the wall. Compile a list of all counties and ask students to rank from highest average annual rainfall to lowest.

<table>
<thead>
<tr>
<th>Group</th>
<th>Counties to Compare</th>
<th>Average Annual Rainfall Range (inches per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Greene and Grundy</td>
<td>Greene (41-52) and Grundy (57-68)</td>
</tr>
<tr>
<td>2</td>
<td>Sullivan and Monroe</td>
<td>Sullivan (41-48) and Monroe (53-81)</td>
</tr>
<tr>
<td>3</td>
<td>Hawkins and Wayne</td>
<td>Hawkins (41-48) and Wayne (53-60)</td>
</tr>
<tr>
<td>4</td>
<td>Robertson and Cumberland</td>
<td>Robertson (49-52) and Cumberland (57-72)</td>
</tr>
<tr>
<td>5</td>
<td>Lake and Sevier</td>
<td>Lake (49-52) and Sevier (41-88)</td>
</tr>
</tbody>
</table>

*Figure 1. Tape on a wall to show the comparison between Grundy and Greene Counties against the national average annual rainfall.*
Figure 2. Map of Average Annual Precipitation across Tennessee counties. Source: University of Tennessee Institute of Agriculture.
The average annual rainfall for the United States is 32-36 inches. Emphasize how all of Tennessee lies above that average. Highlight how this high amount of water as precipitation in the water cycle in Tennessee landscapes results in lush vegetation on the land in natural areas.

Discuss the differences in precipitation and how it affects water availability for plant growth. Discuss how rainfall is distributed over the year in different areas in different ways and affects the adaptations that plants have made to thrive under variable soil moisture conditions. Discuss how precipitation is the input into the water cycle and then that water either infiltrates through soils or runs off the surface, finding a way to replenish streams and rivers or groundwater aquifers. The water cycle connects all land together in the ecosystem.

Other Resources

The US Climate https://www.usclimatedata.com/climate/tennessee/united-states/3212

2020 Tennessee State Climate Summary

Tennessee Climate Office at East Tennessee State University
https://www.etsu.edu/cas/geosciences/tn-climate/tn-climatology.php

NOAA National Centers for Environmental information, Climate at a Glance
https://www.ncdc.noaa.gov/cag/