

The Value of Watersheds: Half-Earth Phenomenal Image

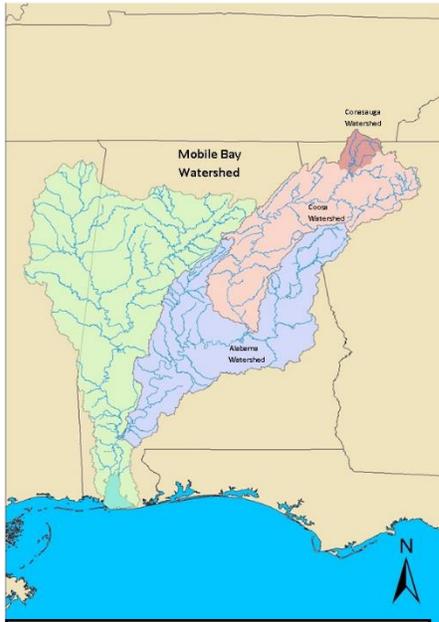


Image 1: Alabama Mobile-Tensaw Delta Watershed



Image 2: Mississippi River Watershed



Image 3: Overlay of both watersheds

The maps depict two independent watersheds in North America that drain into the Gulf of Mexico. The map on the left is of the Mobile-Tensaw Delta Watershed. The map on the right of the Mississippi River Watershed and major tributary rivers. The bottom map provides a scale comparison. A watershed is the entire drainage area, including land, ponds, and streams that contribute to a river and is typically named for that river, stream, or creek. The land area of a watershed channels spring water, rainfall, and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as a larger river, lake, reservoir, bay, sea, or ocean. Many smaller watersheds can contribute to a large watershed, like the Mississippi River Watershed.



Part 1: Map Observations

1. Ask students to look carefully at the maps and describe what they observe. After students read the text, ask them to write two or more questions they have about watersheds.
2. Ask students to explicitly compare the two watersheds, and record what they notice is similar and different. Most importantly, students should notice that the Mississippi Watershed is much larger than the Alabama Mobile-Tensaw Delta Watershed.

Part 2: Comparing the Alabama Mobile-Tensaw Delta Watershed and Mississippi River Watershed

	Alabama Mobile Tensaw Delta Watershed	Mississippi Watershed
Land Area	The watershed of the Mobile-Tensaw delta encompasses more than 43,000 square miles and touches 3 states.	The Mississippi watershed is the largest drainage basin in North America with an area 1,245,000 square miles and touches 32 states.
Total Human Population	About 3 million people rely on the AL watershed for drinking water including three of the state’s largest cities: Birmingham, Montgomery, and Mobile.	About 20 million people across 62 cities rely on the MS watershed for drinking water.
Agriculture	The AL watershed provides water to about 5 million acres of farmland within Alabama and supports the state’s major crops of corn, soybeans, and cotton	The Mississippi River provides water primarily corn, soy, and wheat production crops. The crops within the MS watershed collectively make up more than 90% of all U.S. agricultural exports.
Biodiversity	The biodiversity of the AL watershed includes roughly 300 birds, 450 fishes, 46 mammals, 69 reptiles, 30 amphibians, and 17 turtle species, the most for any river delta on earth with 27 turtle species in entire state.	The biodiversity of the multistate MS watershed includes roughly 260 birds, 120 fishes, 51 mammals, 26 reptiles, 19 amphibians, and 30 turtle species.

Ask students to use the comparison table above to answer the following questions.

1. Which watershed provides drinking water to more people? Use evidence to support your answer.
2. Which watershed provides water to more agricultural crops? Use evidence to support your answer.
3. Both watersheds empty into the Gulf of Mexico. Which watershed empties more water into the Gulf of Mexico? Use evidence to support your answer.
4. Which watershed has a greater diversity of animal species? Use evidence to support your answer.
5. The rivers in watersheds are used for the transportation of goods. Which watershed do you think is most important this use? Use evidence to support your answer.

Part 3: Scientific Connections

Ask students to take their understanding further with the questions below.

1. After reading the excerpt from Ben Raine’s book (Appendix A), why do you think watersheds are important for populations of a species living in an area? Think about food, shelter, and reproduction when responding. Does it matter whether an animal flies, walks or swims? How about plants, does it matter how they spread their seeds?
2. Watersheds are home to biodiversity. The Alabama Watershed is a much smaller area than the huge Mississippi Watershed but is home to an immense diversity of plant and animal life, ranking fourth nationally in overall diversity. What does this tell you about the connection between watershed size and biodiversity? Is size the only important factor for understanding the biodiversity of a watershed? Site evidence from Ben Raines video *Alabama’s Biodiversity Compared to the Amazon*.
3. You live in a watershed. Use [this map](#) to locate the watershed you live in. What is the name of your watershed? What rivers do you live upstream from? What rivers do you live downstream from?



Optional Watershed Extension Activity

Part 1 – Understanding Your Watershed

1. Students have already discovered their watershed. Now ask them to research and create a fact sheet for their own watershed like the one seen in Part 2 above.
2. How could your daily behaviors impact your watershed and those who live downstream from you? Consider how you use water, how you affect what gets into our water systems, and behaviors that can help keep our watersheds safe. - where does your sewer waste go? Where does your agricultural run-off go?
3. What types of business and industries are found in your watershed? How might their production and/or waste affect your watershed? What could companies do to protect your watershed? What businesses and industries are found upstream from where you live and how could they affect your water? What bodies of water are found downstream from you and how does your town impact the watershed and the biodiversity that lives within it?
4. Compare your watershed to that of the Mobile-Tensaw Delta Watershed. What are some similarities and differences?
5. Climate change can impact waterways like rivers and streams through drought, algae blooms, and rising temperatures. How does climate change then impact the watershed?

Part 2 – Biodiversity in the Watersheds

Go to <https://www.mol.org>, select "Species by Location", click "Point" on the next screen then drag the map and zoom in to your location then click to create your local radius.

1. How many amphibians are in this area?
2. How many fish are in this area?
3. How many turtles are in this area?

Go back to the Mississippi watershed map and choose a location to choose as a point location on MOL.org.

4. How many amphibians are in this area?
5. How many fish are in this area?
6. How many turtles are in this area?

Go back to the Alabama watershed map and choose a location to choose as a point location on MOL.org.

7. How many amphibians are in this area?
8. How many fish are in this area?
9. How many turtles are in this area?

10. Compare the biodiversity of these 3 locations. What do you think causes the differences about these watersheds?

CHECK IT OUT: Interactive Watershed Website

Go to <https://river-runner.samlearner.com/>.

1. Ask students to "drop a raindrop" somewhere in the Alabama watershed and follow its path.
2. Ask students to "drop a raindrop" somewhere in the Mississippi watershed and follow its path.
3. Ask students to "drop a raindrop" somewhere in their state and follow its path.
4. Ask students to "drop a raindrop" anywhere in the United States and follow its path.



Appendix A:

Excerpt from “Chapter 9: Dam it All” from *Saving America’s Amazon* by Ben Raines

Millions of years in the making, the great fish migrations of the Mobile Basin ended the year man first walked on the moon. The annual spawning runs of more than a dozen Mobile Basin species were sliced in half when the gates of the Miller’s Ferry Lock and Dam clamped shut on the Alabama River in 1969. The problem was compounded with the addition of the Claiborne Lock and Dam farther downstream two years later. The annual migrations had suffered a crippling blow years earlier, in 1960, when the Tombigbee was dammed, but so long as the Alabama and its tributaries were still connected to the Gulf, fish could move upstream and spawn.

By 1971, the great rivers of the state—the Tombigbee, the Alabama, the Coosa, the Tallapoosa, the Cahaba, the Black Warrior, which together played host to the greatest collection of aquatic diversity in the hemisphere—had been reduced to a single free-flowing section about sixty miles long that encompassed the system’s Mobile-Tensaw Delta and not much else. Fish that had migrated up and down the state’s rivers for eons could no longer make the trip.

The Alabama and the Tombigbee were the Mobile Basin’s main arteries, with thousands of smaller rivers, creeks, and tiny brooks branching off like capillaries in the human blood-stream. After countless insults to the rivers over the preceding two hundred years, those dams finally severed the ancient connection between the tiniest tributary streams in the top of the watershed and the Gulf of Mexico. That connection, linking the mountains to the sea, was really about energy. All the biological energy generated by the plants and animals in the watershed was gathered every year and delivered to points downstream with the annual floods. But that flow was suddenly cut off by the dams, starving the entire system of nutrients, floodplain-building sediments, and—for many creatures—the basic ability to reproduce.

But that energy exchange also flowed uphill, in the form of the millions of fish that migrated upstream, their oily flesh carrying massive stores of energy gathered out in the open ocean, or in the brackish lower reaches of the estuary and the energy-rich Delta. Just as salmon on the West Coast feed and fertilize the upper reaches of their home rivers with energy from the ocean when they die after spawning, so did the fish that migrated up Alabama’s rivers.

Mooneyes, striped mullet, striped bass, menhaden, the American eel, needlefish, Alabama Shad, skipjack herring, Gulf sturgeon, paddlefish, and a dozen other species all made spectacular runs up and down the rivers before the dams.

For instance, both mullet and the Alabama shad migrated all the way from the Gulf to the Cahaba River around Birmingham or to the Black Warrior around Tuscaloosa, more than three hundred miles inland. Those migrations, which involved millions of fish, ended almost overnight when the dams came in. A few mullet still make it up the Cahaba, but they are measured in individual fish these days, not in the millions of pounds the way they used to be. And the Alabama shad, which once supported a thriving commercial fishery in the rivers, has become so rare it was recently labeled a “Species of Greatest Conservation Need” by federal officials. The best hope for survival of Alabama’s namesake shad now lies in Florida’s Apalachicola River, where they are able to migrate about a hundred miles upriver before hitting a dam.