

Watersheds: Role, Importance, & Stewardship



“Watersheds come in families; nested levels of intimacy...

As you work upstream toward home, you’re more closely related.” – Michael Parfit

What Is a Watershed?

Anyone who lives on land resides on and interacts with a watershed daily. Because of this exposure to watersheds, it’s important to understand what they are, why they are important, and how we can be good stewards of our watersheds. A watershed is an area of land draining into a common body of water, such as a river, wetland, reservoir, or ocean. Rain that falls on land flows to lower elevations and toward a common body of water; the rain transports with it many particulates and pollutants from the land.

The term *watershed* is sometimes used interchangeably with the terms *drainage basin* and *catchment*. Watersheds can vary in size from just a few acres to thousands of square miles, and they are nested in organization. Being nested means that multiple smaller watersheds comprise a larger watershed. For example, in **Figure 1**, the smaller-component watersheds eventually drain into the Mississippi River; collectively, they are known as the Mississippi River Basin.

Watersheds are connected through the movement of water. Water is important in this process, as it carries nutrients, sediments, and pollutants from higher to lower elevations. Water also moves through the subsurface and creates a moisture gradient in the soil. This is why uplands tend to have drier soils than bottomlands. The various moisture types in Mississippi watersheds

provide diverse habitat resources for plants and humans. These habitat resources may sometimes seem insignificant, but a few feet in elevation can mean a big difference in water availability to plants. Furthermore, many fish, amphibians, reptiles, birds, and mammals use more than one habitat in a watershed throughout their lifetimes, making the diverse parts of the watershed essential to their life cycles.

A healthy watershed is one that sustains ecosystem function and provides for human well-being and livelihood (i.e., ecosystem services). In many cases, human needs and ecosystem functions work well together. Unfortunately, degraded watersheds cannot offer quality water resources for humans and animals. Because watersheds provide numerous benefits for our communities and the environment, it is important to consider how to protect the integrity of our local watersheds.

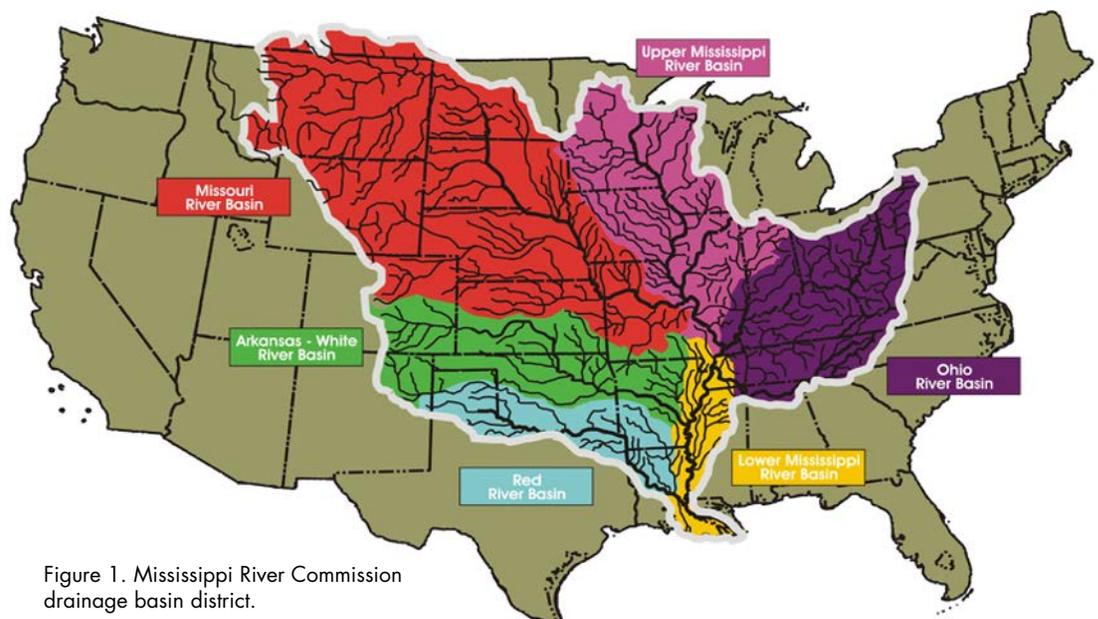


Figure 1. Mississippi River Commission drainage basin district.

Fast Fact | The state of Mississippi has approximately 81,300 miles of river, 1,500 square miles of surface water, and 6,200 square miles of wetlands within its borders (“National Wild and Scenic Rivers: Mississippi”; “Wetlands Protection”, 2007). Mississippians use these important water resources for drinking water, irrigation, and recreation. Industrial and electrical plants also use them. In addition, they provide habitat for plants and animals.

Importance of Healthy Watersheds to the Environment

Biological, physical, and chemical processes occurring within watersheds provide critical ecosystem functions and services that support plants and animals, including humans. Nutrient cycling, carbon storage, erosion control, soil formation, increased biodiversity, wildlife corridors, water storage, water filtration, flood controls, timber, and recreation are just a portion of the services provided by ecosystems within watersheds. For instance, riparian forests (forest habitat adjacent to streams) act as buffers to nonpoint source pollution and as corridors for animal foraging (Clipp & Anderson, 2014). The role of watersheds in nutrient cycling is important for stabilizing the environment at local and global scales (Allan & Castillo, 2007). Forested headwater streams function to filter sediment and pollutants, which directly benefit humans and other animals in the form of clean water. At a larger scale, naturally vegetated floodplains provide storage and slow release of water. This benefit reduces the risk of flooding for anyone who lives near a river. Stable soils, an absence of pollutants, and a rich biological community are all characteristics of a healthy watershed (USEPA, 2017). When watersheds are degraded and pollution ensues, ecological benefits and services can be reduced or completely lost.

Within watersheds, much of the water transported from high to low elevations is carried through streams and rivers. Because this water carries sediments and pollutants from the land area it drains, impairments in rivers and streams are indicators of unhealthy watersheds caused by upstream land use. The U.S. Environmental Protection Agency reported that 44 percent of the nation’s rivers and streams and 64 percent of lakes, ponds, and reservoirs were impaired or not clean enough to support their designated uses (2009). The *National Water Quality Inventory: Report to Congress* documented that the leading causes of impairment to rivers, streams, lakes, ponds, and reservoirs are pathogens, habitat alterations, and toxins and pollutants in the water. The main causes for these pollutants include agricultural activities, hydrologic modifications, atmospheric deposition, and other unknown

or unspecified sources (USEPA, 2009). If water bodies can no longer support their designated or natural uses, the environment and/or humans will be negatively impacted.

Watersheds and Communities

Watershed health has been linked to economic benefits for communities. The Millennium Ecosystem Assessment’s “Ecosystems and Human Well-being” (2005) argued that human well-being is fundamentally dependent on ecosystem services, subcategorized as provisioning, cultural, regulating, and supporting services. While it’s difficult to put an exact value to every ecosystem function and service, some estimate the cost of ecosystem losses between \$4.3 trillion and \$20.2 trillion per year (Costanza et al., 2014). It is clear that the cost of restoring lost ecosystem function or using an alternative method or technology to provide a specific ecosystem function can be high. New York City is one example of a community choosing to invest in ecosystem services to reduce capital costs. City officials decided to improve the watershed’s natural land cover and forest to provide water filtration. Ultimately, this decision was significantly more cost-effective (estimated \$6.5 billion in savings) than installing a multi-billion dollar water treatment facility (Barnes et al., 2009). This case highlights how maintaining and protecting healthy watersheds can reduce capital costs for public services.

In addition, watershed health has been linked to mental and physical health benefits. The National Park Service (1995) found that people in healthy watersheds are more likely to exercise, because they have easy access to forests, greenways, parks, and trails (USEPA, 2017). The distribution of healthy watersheds is uneven across biophysical and socioeconomic categories—better health and economic outcomes consistently correlate with access to ecosystem services (USEPA, 2016).

Protecting Your Watershed

You can help protect your watershed by integrating good management practices at home and in your community. At home, it is important to reduce pollution, protect against floods, and conserve water (Mississippi

Water Resources Research Institute, Mississippi Department of Environmental Quality, & MSU Landscape Architecture, 2013b). Simple steps like properly fertilizing your lawn, appropriately disposing of waste, planting more trees, and harvesting rainwater for garden and lawn irrigation have substantial impacts on watershed health.

To make an even larger impact, these principles can be adopted in community-wide agreements and ordinances. Towns and communities help protect their downstream neighbors by planning community development, protecting natural areas, and adopting best management practices (Mississippi Water Resources Research Institute, Mississippi Department of Environmental Quality, & MSU Landscape Architecture, 2013a). The Atlanta Tree Conservation Commission is a citizen board that helps protect, maintain, and regenerate trees. Through the City of Atlanta Tree Protection Ordinance, citizens are able to reap the benefits of decreased air and noise pollution, reduced energy demand thanks to shading, and an improved community aesthetic (Mississippi Water Resources Research Institute et al., 2013a; for more, visit atlantatreecommission.com).

Simple and easily implemented strategies are often the ones that have the most immediate impact. Learning about your property and local watershed is the first step to obtaining good watershed health. There are many organizations within Mississippi that are striving to improve and provide education about watersheds. Below are a few resources you can use to learn more and take action to protect your water.

Managing Your Home Watershed

https://extension.msstate.edu/sites/default/files/topic-files/healthy-soils-and-water/managing_your_home_watershed.pdf

Community Watershed Protection

http://extension.msstate.edu/sites/default/files/topic-files/healthy-soils-and-water/community_watershed_protection.pdf

Adopt-A-Stream Mississippi

<http://mswildlife.org/AAS/Mississippi> Department of Environmental Quality – Water Program

http://www.deq.state.ms.us/mdeq.nsf/page/SurfaceWater_home?OpenDocument

Environmental Protection Agency – Surf Your Watershed

<https://cfpub.epa.gov/surf/locate/index.cfm>

Atlanta Tree Conservation Commission

<http://www.atlantatreecommission.com/>

References

- About the Mississippi River Commission. (n.d.). Retrieved September 21, 2016, from <http://www.mvd.usace.army.mil/About/Mississippi-River-Commission-MRC/>
- Allan, J. D., & Castillo, M. M. (2007). *Stream ecology: Structure and function of running waters. Ecology* (Second). Dordrecht, Netherlands: Springer. <http://doi.org/10.2307/2265800>
- Barnes, M. C., Todd, A. H., Lilja, R. W., & Barten, P. K. (2009). *Drinking Water Supply and Forest Lands in the Northeast and Midwest United States Forests*.
- Clipp, H. L., & Anderson, J. T. (2014). Environmental and Anthropogenic Factors Influencing Salamanders in Riparian Forests: A Review, 2679–2702. <http://doi.org/10.3390/f5112679>
- Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S. J., Kubiszewski, I., Farber, S., & Turner, R. K. (2014). Changes in the global value of ecosystem services. *Global Environmental Change*, 26(1), 152–158. <http://doi.org/10.1016/j.gloenvcha.2014.04.002>
- Ecosystems and human well-being. (2005). Retrieved May 3, 2017, from Millennium Ecosystem Assessment website: <file:///C:/Users/water%20quality/Downloads/MEA%20synthesis%202005.pdf>
- Mississippi Water Resources Research Institute, Mississippi Department of Environmental Quality, & MSU Landscape Architecture. (2013a). Community Watershed Protection. Retrieved from http://extension.msstate.edu/sites/default/files/topic-files/healthy-soils-and-water/community_watershed_protection.pdf
- Mississippi Water Resources Research Institute, Mississippi Department of Environmental Quality, & MSU Landscape Architecture. (2013b). *Managing Your Home Watershed*.
- National Wild and Scenic Rivers System (Ed.). (n.d.). National Wild and Scenic Rivers: Mississippi. Retrieved May 3, 2017, from <https://www.rivers.gov/mississippi.php>
- United States, Environmental Protection Agency (USEPA), Office of Water. (2009, January 15). *National Water Quality Inventory: Report to Congress*. Retrieved September 14, 2016, from https://www.epa.gov/sites/production/files/2015-09/documents/2009_01_22_305b_2004report_2004_305breport.pdf. Annotation: Report Number EPA 841-R-08-001
- United States Environmental Protection Agency. (2016, November 09). Overview: Selecting and Using Recovery Potential Indicators. Retrieved May 03, 2017, from <https://www.epa.gov/rps/overview-selecting-and-using-recovery-potential-indicators>
- United States Environmental Protection Agency (USEPA). (2017, April 26). Healthy Watersheds: Materials for Technical Audiences. Retrieved May 03, 2017, from <https://www.epa.gov/hwp/healthy-watersheds-materials-technical-audiences>
- Wetlands Protection. (2007, Summer). Retrieved September 14, 2016, from http://www.deq.state.ms.us/MDEQ.nsf/page/WQCB_Steam_Wetland_Alteration03?OpenDocument

Publication 3082 (POD-05-17)

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Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director