



Indian Creek, Howell County, Mo.
(photograph by Matthew Struckhoff, USGS).

The Ozark Highlands

A Distinctive Landscape

The Ozark Highlands (referring herein to an area that includes the Ozark, Ozark Highlands, and Boston Mountains Ecoregions of various classification systems and generally corresponds to the Springfield Plateau, Salem Plateau, and Boston Mountains physiographic areas) include diverse topographic, geologic, soil, and hydrologic conditions that support a broad range of habitat types. The landscape features rugged uplands—some peaks higher than 2,500 feet above sea level—with exposed rock and varying soil depths and includes extensive areas of karst terrain. The Highlands are characterized by extreme biological diversity and high endemism (uniqueness of species). Vegetation communities are dominated by open oak-hickory and shortleaf pine woodlands and forests. Included in this vegetation matrix is an assemblage of various types of fens, forests, wetlands, fluvial features, and carbonate and siliceous glades.

An ever-growing human population in the Ozark Highlands has become very dependent on reservoirs constructed on major rivers in the region and, in some cases, groundwater for household and public water supply. Because of human population growth in the Highlands and increases in industrial and agricultural activities, not only is adequate water quantity an issue, but maintaining good water quality is also a challenge. Point and nonpoint sources of excessive nutrients are an issue. U.S. Geological Survey (USGS) partnership programs to monitor water quality and develop simulation tools to help stakeholders better understand strategies to protect the quality of water and the environment are extremely important.

The USGS collects relevant data, conducts interpretive studies, and develops simulation tools to help stakeholders understand resource availability and sustainability issues. Stakeholders dependent on these resources are interested in and benefit greatly from evolving these simulation tools (models) into decision support systems that can be used for adaptive management of water and ecological resources.

The Importance of the Ozark Highlands

- Most significant highland region in central North America.
- High levels of terrestrial and aquatic endemism: more than 200 species largely restricted to the Highlands, of which about 160 occur nowhere else in the world.
 - More than average rate of growth in human population and agricultural and commercial activity.
 - Increasing potential for negative human impacts.
 - Competing demands for water resources.
 - Contain the three largest single-conduit springs in the United States.
 - Important center for neotropical bird migration and breeding grounds.
 - Largest extent of glade communities in North America (historical extent of open woodlands rather than closed forests).
 - Are home to nearly two-thirds of the 45 federally listed plants and animals in Missouri, Arkansas, and Oklahoma but contain only one-fourth of the land mass in those States.



- Contain the world's largest active lead/zinc mining district (the Viburnum Trend) and several other large inactive districts.
- Valued outdoor recreation and tourism use on private and public lands.

Research and Science Opportunities in the Highlands

The interaction of unique and high-quality biological and hydrologic resources and the effects of stresses from human activities can be evaluated best by using a multidisciplinary approach that the USGS can provide. Information varying from defining baseline resource conditions to developing simulation models will help resource managers and users understand the human impact on resource sustainability. Varied expertise and experience in biological and water-resources activities across the entire Highlands make the USGS a valued collaborator in studies of Ozark ecosystems, streams, reservoirs, and groundwater. A large part of future success will depend on the involvement and active participation of key partners. Key science questions include the following:

- How can research and monitoring be done on Ozark Highlands natural resources in a way that meets current and future sustainable management objectives?
- How will global climate change affect the ability to sustainably manage resources?
- How is the optimum management action determined for a particular site given local conditions, short- and long-term goals, and social issues?
- What are the appropriate metrics that allow assessment of management effectiveness in aquatic, terrestrial, and subterranean ecosystems at multiple scales, from local to regional?
- How are land uses and associated practices (including emerging gas exploration and extraction dynamics) affecting water resources and biological communities?
- What tools are available and what tools are needed to effectively collect and share data and information concerning the Ozark Highlands?

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Why Good Science Matters

Stakeholders in the Ozark Highlands are dealing with human and animal population growth issues related to water supply and waste disposal. Quantity and quality of surface water and groundwater are of vital importance to individuals, families, and communities. Important, valuable, and often unique ecosystems may be inadvertently threatened by those who value them most without the accurate and defensible data and information necessary for adaptive management approaches that can help ensure resource sustainability. Already, important terrestrial and aquatic species are federally listed as threatened; some caves are inundated with sediment; surface and subsurface streams are receiving nutrient inflows that can lead to degradation beyond their ecological capability to overcome; and a number of glade and forested lands are becoming fragmented or disappearing altogether.

The Ozark Highlands provide numerous recreational and tourism opportunities. Many businesses rely on the recreational and tourism value of clean streams and lakes and the commodity value of natural resources such as water, timber, mined metals, and sand and gravel. Much that we value in the Highlands depends on sustainable water supplies and ecosystems. The need to monitor and understand the integral hydrologic and ecological process dynamics in the Highlands is critical and must be addressed if we are to meet the current and future environmental and social demands on the Ozark Highlands.

USGS Role in the Ozark Highlands

Several government agencies and nongovernment organizations share the general goal of maintaining or increasing the quality of natural resources in the Ozark Highlands while maintaining a viable economy. Each of these agencies and organizations has unique perspectives and capabilities. The USGS is well suited to provide the scientific leadership necessary to address this goal because of its physical presence in each State, broad multidisciplinary expertise, and nonregulatory/nonmanagement mandate. The USGS and partners will identify common regional goals and objectives, threats and emerging issues, and information gaps; coordinate the collection of baseline data to provide a starting point for all assessment efforts, as well as regular and continual monitoring and assessment activities; develop simulation tools to help stakeholders with resource adaptive management and sustainability; and disseminate information to resource managers, researchers, legislative bodies, and the public.