

MAMMOTH CAVE AREA BIOSPHERE RESERVE

Making a difference in groundwater protection

By JEFF BRADYBAUGH

THE MAMMOTH CAVE AREA Biosphere Reserve (MCABR) was designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in 1990. It includes Mammoth Cave National Park and its primary groundwater recharge basins, an area totalling 44,700 hectares (110,453 acres). The park is the protected core area, and the basins outside the national park are designated the zone of cooperative use. Located in south-central Kentucky, the area is a karst landscape typified by numerous sinking streams and sinkholes, complex underground watercourses, and a multilayered cave system (longest in the world) with unique fauna and mineralization features. The karst landscape efficiently transports precipitation runoff (and any incorporated contaminants from surface land use) to subsurface streams, posing constant concern for area water quality degradation (fig. 1).

At the suggestion of the National Park Service and others, the Barren River Area Development District (BRADD) selected the UNESCO biosphere reserve model as the tool to address regional water quality issues. Chartered by the Commonwealth of Kentucky, BRADD is responsible for regional planning within the 10-county area surrounding Mammoth Cave National Park. With the biosphere reserve administered through BRADD, whose board of directors consists of locally elected officials, the biosphere program is viewed as a locally managed effort rather than a federal undertaking. As nearly all the land outside of the park is in private ownership, this organizational structure has proven critical to initiating and carrying out biosphere reserve programs.

The Barren River Area Development District established a biosphere reserve council to coordinate resource management activities. The council is comprised of technical specialists from: Western Kentucky University, USDA (U.S. Department of Agriculture) Forest Service, USDA Combined Farm Services Agency, USDA Natural Resources Conservation Service, Tennessee Valley Authority, U.S. Economic Development Administration, U.S. Army Corps of Engineers, agencies of the Kentucky natural resources cabinet, the Resources Conservation and Development District, the Caveland Sanitation Authority, and the National Park Service.

IMPLEMENTATION OF THE BIOSPHERE RESERVE PROGRAM

Several noteworthy programs and projects have been initiated or enhanced through the collective efforts of the governments and agencies cooperating under the Mammoth Cave Area Biosphere Reserve umbrella.

MAMMOTH CAVE AREA WATER QUALITY PROJECT

To protect the Mammoth Cave watershed, a partnership was established with farmers, universities, and agencies to protect aquatic resources by promoting sustainable agriculture and on-the-farm *best management practices* (BMPs). Since 1990, the USDA has made available \$950,000 on a cost-sharing basis with local farmers for the design and installation of animal waste BMPs for feedlots and dairies. Agencies, including the National Park Service, have invested \$330,000 in groundwater and aquatic community monitoring to assess the effectiveness of BMPs. An Environmental Protection Agency grant has been secured to continue this project over the next four years.

REGIONAL GIS/GPS AND DEVELOPMENT OF A GEOSPATIAL DATA CENTER

Members of the biosphere reserve council have pooled their resources to enhance data sharing and data analysis capabilities. A GIS (Geographic Information System) was established at BRADD to supplement and interact with partner systems. Agencies contributed to purchase a GPS (global positioning satellite) base station that has been used in developing groundwater hazard maps where interstate highways and railroads cross the groundwater basins (fig. 1). The series of maps allows emergency responders to identify sites where hazardous spills from road or rail accidents could enter sinks or otherwise be injected into the aquifer, and allows them to quickly formulate a containment strategy. With support from the Mammoth Cave Area Biosphere Reserve and park assistance via the NPS Lower Mississippi Delta Initiative, the GPS system is being used to map features of a local civil war battlefield, assisting community efforts for its protection. Through a grant from the U.S. Geological Survey (USGS), the biosphere reserve has established a geospatial data center at Western Kentucky University, as a node of the nationwide USGS system.

ECONOMIC DEVELOPMENT AND IMPACT STUDIES

The Economic Development Administration funded a MCABR study to assess the potential for compatible industrial development along Interstate 65 within the reserve. Existing and potential environmental risks and identification of suitable and unsuitable development locations were analyzed. Through the Barren River Area Development District, this information has been made available to the affected communities to assist in economic and infrastructure planning.

The National Biological Service, Michigan State University, and Southern Illinois University are nearing completion of a visitor use and economic impact study for the park and local area. Data will be used to assess the impact of tourism expenditures locally and to formulate regional plans for sustainable tourism currently under development by the West Kentucky Corporation.

ENVIRONMENTAL EDUCATION

Plans for a nonprofit institute, as part of the biosphere reserve, are being developed to extend and enhance the education and research programs available to local residents and resource managers, including environmental and cultural resource management, sustainability, and heritage appreciation.

To keep the public informed of ongoing water resource management efforts in the biosphere reserve, an educational video was produced through Kentucky Educational Television. It describes the broad concerns of stakeholders, how consensus planning was used to focus on common goals, and the actions taken to enhance water quality. The video emphasizes the progress made through cooperation between businesses, landowners, and agencies working within the reserve.

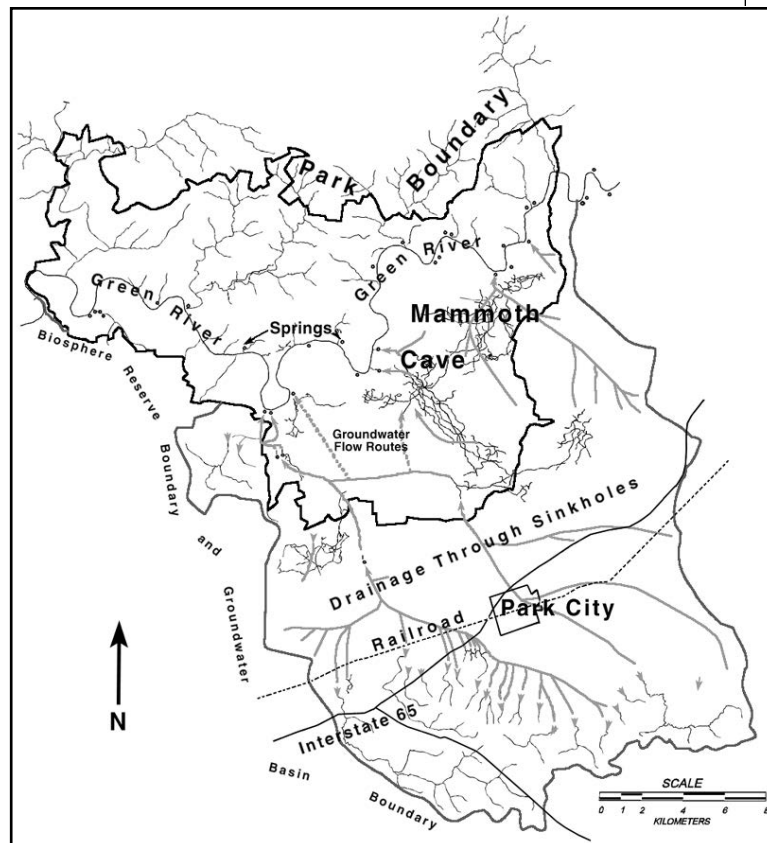
MAMMOTH CAVE RESOURCES CONSERVATION AND DEVELOPMENT AREA

With the intense focus on water quality in the karst aquifer and the need to remedy related agricultural impacts, agency managers and local officials petitioned the Secretary of Agriculture to designate an area in south-central Kentucky including the biosphere reserve as a resources conservation and development area (RC&D). Established in 1991 and represented on the biosphere council, the RC&D uses its resources to meet goals common to both programs. The RC&D receives USDA funding each year, available for matching grants, to accomplish projects relating to solid waste management, non-point source pollution control, conservation education, and rural infrastructure. While most projects are relatively small in size, they provide rural

communities with opportunities to address longstanding problems and to become participants in regional conservation efforts.

opportunity exists to develop greater involvement of rural and small-town residents, to work with commercial natural resource users, and to partner with people

Figure 1. The Mammoth Cave Area Biosphere Reserve (gray boundary line—before the recent expansion) encompasses Mammoth Cave National Park (black boundary line) and most of the Groundwater Basin, the primary groundwater recharge area for the cave. The thick gray lines terminating in arrows indicate the flow of precipitation runoff (and contaminants) through neighboring towns and across highways enroute to the cave. The



recently expanded biosphere reserve increases opportunities to promote a water quality program throughout the Groundwater Basin that will help protect cave resources.

WHAT THE FUTURE HOLDS

The Mammoth Cave Area Biosphere Reserve, with the national park as the core area, has brought national attention to local conservation issues, including additional financial resources not available previously. Landowners and communities have derived tangible benefits and received recognition for working together to protect resource values. The park benefits in that external resource threats and issues are being addressed and a forum exists to discuss long-term resource protection policies with local officials.

In August, the USMAB National Committee approved expanding the biosphere reserve to 368,000 hectares (909,328 acres). Within the expanded reserve, an

interested in conservation of historic resources and the cultural traditions of the region. These opportunities reflect the continuing growth of the biosphere reserve program. In addition to providing a larger land area, the expanded biosphere reserve also continues the focus on areas of critical environmental concern—especially the Mammoth Cave groundwater basins.

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