

# An Underground Experience

BY TOMMY NEWTON

**EVEN THOUGH HE HAS TRAVELED DEEP INSIDE THE MAMMOTH CAVE SYSTEM AND VISITED CAVES IN CHINA, NEW ZEALAND, FRANCE, AND THIRTEEN OTHER COUNTRIES, CHRIS GROVES IS STILL WAITING FOR A ONCE IN A LIFETIME EXPERIENCE. BUT HE ISN'T EXPECTING ONE ANY TIME SOON. "I JUST DON'T KNOW WHAT'S GOING TO HAPPEN TOMORROW OR THE NEXT DAY," HE SAID.**

As director of WKU's Hoffman Environmental Research Institute and professor of geography, Groves has built an international reputation in the cave and karst research field. He was elected president of the Cave Research Foundation in late 2004; he has worked with karst scientists in China for nearly a decade; and in February he traveled to Paris, France, where the research project Global Study of Karst Aquifers and Water Resources was approved by the United Nations' scientific arm, UNESCO. In collaboration with three co-leaders from China, Spain, and England, Groves will lead the five-year project that includes about 150 scientists from more than thirty countries.

In the past five years, Groves' research trips have taken him and his wife Deana, a faculty member in WKU's library system who has been actively involved in the collaborative research effort, throughout much of the world.

For many people, any of those visits could be the trip of a lifetime. But not for Groves. "It's impossible to know of what the possibilities might be, which is part of what's so exciting about it," he said. "I can't really say where all this should end up. The possibilities are so awesome that I can't dream what they would be."

Groves has been dreaming those dreams since he was a child growing up in Maryland. "Pretty much my pathway was set at the age of four," he said. "When I was little my dad was taking a geology class while

going to night school at Johns Hopkins University. During those days he would come home from his classes and talk to me and my brother about the things he was studying, and the stories from his geology class captivated me. When over that Christmas break he took me out with him to collect minerals where his class had taken a field trip, I realized even at that early age I couldn't imagine a better job."



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Then when Groves was six, his grandmother gave him a National Geographic magazine with a story on caves. "I was looking through that article and there was a picture of some guys in a cave standing in an underground river," he said. "The first thing I thought was that's the creepiest thing I could imagine. Not much later though, it occurred to me that walking deep in a cave somewhere, especially waist deep in an underground river, was about as far out as you could be and

still be here on earth. That thought was very appealing to me." He was hooked.

In 1981, Groves made his way to Western Kentucky University to work on his undergraduate and master's degrees. He was drawn to WKU because geography professor Nick Crawford had founded the Center for Cave and Karst Studies in 1979, and because Mammoth Cave National Park, with the world's longest known cave, was nearby.

"One of the great cave laboratories of the world is right here," Groves said of Mammoth Cave. "What drew me to Western was this combination of being able to learn about caves and science but also on weekends and evenings to actually go out and explore new caves." Groves has been involved in exploring, surveying and studying Mammoth Cave and other southcentral Kentucky caves ever since.

More than twenty years later that same attraction continues to draw students from around the country to WKU. "It's part of an almost magical lure for students interested in caves that come to WKU," Groves said, "and a key reason why we continue to draw an extremely high level of both undergraduate and graduate students drawn to the karst program.

"Even more than that, since there are a lot of places in the world where there are caves and universities, what sets it apart here is the fact that Mammoth Cave is the biggest cave in the world and that separates it from other karst areas."

In 2005, Groves is focusing on two related international studies that involve karst water resources: a global study of karst water resources through UNESCO and planning for a collaborative project through USAID between the U.S. Geological Survey and WKU to develop a center for environmental health and research in China.

The overall theme of the environmental project is to seek solutions for environmental problems associated

with the natural conditions in China, including problems with drinking water supplies in the karst areas. In addition, some coal deposits in the region naturally contain high levels of arsenic. The Chinese people dig up the coal from hillsides and burn it in their homes. "The people are so poor that many don't have chimneys because that would let the heat out, so people are breathing arsenic, and eating it along with dried chili peppers that they dry over the coal fires," Groves said.

For Groves, his work comes down to basic research (how caves are formed) vs. applied research (how can problems be solved). "In China in particular I've gone over there to look at basic research questions like how do caves form and what's happening to CO<sub>2</sub> in the atmosphere. Then I realized at the same time we're going to these caves I look around and see a village with people whose average salary is \$60 a year," he said. "More and more it occurred to me that we're spending a considerable amount of resources — both financially and intellectually — to look at relatively esoteric questions when we could be taking the same energy and applying it to getting better water supplies for people."

In the spring of 2004, for example, Groves traveled to China to organize an expedition to western Hunan Province where WKU graduate students and other experienced cavers from around the United States explored and mapped a cave system to aid Chinese geologists and engineers with the construction of an underground dam/reservoir system that, if ultimately successful, will make water more readily available to tens of thousands of very poor residents of villages on a high plateau above the cave system.

In the village on the plateau where the WKU caving expedition stayed, for example, during the region's winter dry season residents can spend up to



Photo courtesy of Mark Graham

A WKU expedition of Big Dragon Cave in China was the first-ever US cave scuba diving to take place in China. At almost 900 feet tall, the waterfall is about three times the height of Pearce-Ford Tower, the tallest building on WKU's campus.



Photo by LaDonna Harmon

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several hours per day walking to small springs to obtain drinking water. The cave surveys required descending deep pits by rope, as well as the first American cave scuba diving ever carried out in China.

In another recent project, in February 2005 a WKU team organized by Groves and his Chinese colleagues traveled to Wanhuyan (Ten Thousand Flowers Cave) near Chenzhou in eastern Hunan to map unexplored regions of the cave system and assist with development of new tours in the cave. Like other parts of southwestern China's karst region, limited means of economic resources mean that tourism plays a key role in sustainable development and the quality of life for the region's residents.

Overall, in southwest China, eighty million people live in a largely rural cave and karst area, and about ten percent of them earn an average salary

of less than \$100 a year — far below the U.S. poverty level.

Western's growing reputation for cave and karst research has allowed Groves and his students to work with scientists studying water issues around the globe in places like Eastern Europe, Asia and South America.

In August 2005 Groves, along with Nick Crawford and about a dozen of their students, will attend an international cave and karst science conference in Greece, which will allow the group to interact with karst researchers from throughout the world. "This is a way we can build relationships and communication with people all over the world interested in karst. A fringe benefit for Western and myself and students is that from these activities we've got colleagues throughout many of the great karst areas of the world. So if we want to work on a project in Thailand or

Europe there are partnerships we can develop."

While Groves continues to develop those global relationships and projects, he maintains numerous relationships and projects, including cave formation, cave chemistry, and water quality, at nearby Mammoth Cave National Park. "The relationship between Mammoth Cave National Park and Western Kentucky University is very important for several academic areas in Ogden College and throughout WKU," he said.

One project Groves and park hydrologist Joe Meiman have been working on in recent years involves the removal of carbon dioxide gas from the atmosphere as water dissolves limestone in the cave. The issue, though small compared to impacts

on the global carbon cycle by other processes such as fossil fuel burning, represents a relatively poorly understood piece in the overall carbon cycle and the associated potential for global climate change, he said.

"Carbon is involved in so many complex processes and we need to better understand how CO<sub>2</sub> levels are impacted," Groves said. "My colleagues and I at Mammoth Cave have been working on figuring out how to better measure that more accurately."

The work has now been expanded to other sites such as China, Sequoia National Park in the mountains of central California, and a new site in southeastern Alaska currently under development. Groves explained, "Understanding the details of processes that affect the carbon cycle helps us better understand the potential for global climate change. But there are a lot of complexities."