

## Fragile Underground

Caves are the world's most remote and fragile wilderness. They provide irreplaceable habitats for rare plants and animals, some of which spend their entire lives in complete darkness. On its way to our drinking supply, water often travels through caves into wells, springs, and aquifers, the source of most of our drinking water. A cave's intricate passageways and dramatic formations offer exquisite scenery and fascinating opportunities for research and mapping. Many caves also preserve fragile prehistoric and historic records for millennia.

Caves, however, are threatened by human activities above and below ground. Carelessness and ignorance, as well as intentional vandalism, can quickly—and permanently—damage a cave: its formations, its environment, and the plants and animals that live there.

## Karst Matters

Karst landscapes include caves, sinkholes, underground streams, and other features formed when bedrock is dissolved by water. Lava tube caves are *pseudo-karstic* features, created by volcanic activity. One-fifth of the nation's land area is karst, and nearly every state has caves, as well as most countries in the world.

"Karst areas are among the world's most diverse, fascinating, resource-rich, yet problematic terrains. They contain the largest springs and most productive groundwater supplies on Earth. Karst is the landscape most vulnerable to environmental impacts. Careful use of karst areas can produce substantial economic and scientific benefits. Sound management of karst requires the conscientious participation of citizens"\* and land-use decision makers, often working closely with speleologists who explore, survey, and study caves.

## Protecting Our Water

Caves play a vital role in the quality of our drinking water. In karst and pseudo-karst areas, surface water flows into caves very quickly, receiving very little filtration. This water, and the impurities it carries—human and animal waste, pesticides, fertilizers, petroleum products, and other pollutants—often travel great distances underground, contaminating wells, springs, and aquifers. Only by wisely and carefully managing the relationship between karst and water, and keeping pollutants from entering caves, can we protect the quality of our drinking water.

## Nature's Masterpieces

Deep in the earth, drop by drop, crystal by crystal, a solution of water and minerals seeps through cracks in the rock, depositing formations, or *speleothems*, on the floors, ceilings, and walls of caves. Yet, a single careless touch or malicious gesture can destroy what took centuries to form. **Once damaged or destroyed, cave formations can never be replaced.** To preserve this fragile resource, Congress passed the Federal Cave Resources Protection Act in 1988 to "secure, protect, and preserve significant caves on Federal lands for perpetual use, enjoyment, and benefit of all people." Many states also have laws protecting caves and their contents.

## Keepers of our Past

Caves offer invaluable clues to the earth's most significant geologic events as well as our prehistoric and historic past. Deep underground, caves have preserved the fossils of man, as well as extinct plants and animals. Caves also have served, since prehistoric times, as homes, burial grounds, and sites for religious practices. Unlike any other environment, the nearly constant temperature of a cave preserves our most sensitive archaeological and cultural sites.

## Fragile Habitats

Cave-dwelling animals—*troglobites*—are unique species of insects, crustaceans, and fish that spend their entire lives underground, living in total darkness. Because troglobites cannot live outside a cave, their survival is endangered if the cave environment is damaged or altered.

Biologists recently have discovered cave-dwelling *extremophiles* whose food web is based on *chemosynthetic*, or "mineral-eating" bacteria. These organisms provide clues about the earliest forms of life on Earth, and are being studied by scientists at the National Air and Space Administration to learn about the potential for life on Mars. Extremophiles also show promise as a source of new antibiotics and other medications. Water pollution, visitor traffic, trash, flooding, and a change in air patterns or temperature can contribute to altering and unbalancing a cave's fragile food web and ecosystem. **Once destroyed, these isolated environments have little chance to ever regenerate.**



photo by Ed McCarthy



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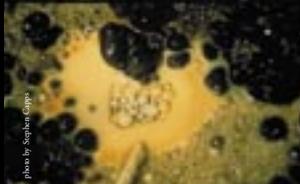


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## Bats Need Friends

Animals that make their homes in caves, but return to the surface to feed—including bats, bears, packrats, snakes, raccoons, swallows, moths, foxes, and people—are troglomenes. Among these, bats play an important role in the balance of nature. Most North American bats eat insects, and a single small bat can eat 1,200 mosquito-sized insects an hour. For example, a colony of 150 Big Brown bats can protect local farms from up to 33 million rootworms each summer. Other bats feed on fruit and nectar, and in the wild, they pollinate and disperse seeds for important agricultural plants. In addition, bat droppings are a valuable source of fertilizer, and an important link in the food web of a cave habitat. Unfortunately, today more than half of all American bat species are in severe decline or are already endangered, largely because pesticides have severely reduced their food supply. Moreover, cave habitats are being destroyed, their entrances are being closed, or human visitors are disrupting bat nurseries and hibernating colonies. Worst of all, people who fear or misunderstand the value of bats are deliberately killing them.

## What Lies Ahead

Many caves and their contents have been destroyed or badly damaged as a result of human activities. Rare species of cave-dwelling creatures are threatened or already endangered. Water quality in aquifers, wells, and springs has diminished. **Fortunately, there is time to protect our remaining caves and karst resources.**

### *How you can help protect and preserve the fragile underground*

- Keep sinkholes free of garbage, sewage, oil, and other contaminants.
- Keep streams in karst areas clean by controlling runoff from farming, mining, and timbering operations.
- Never damage formations, deface or write on the cave walls. Leave artifacts as you find them.
- Oppose the sale of cave formations.
- Report and prosecute cave vandals. The NSS offers a reward for those who do so.
- Respect cave dwelling animals, and leave their unique habitats undamaged.
- Play a critical role in conservation and education by contributing to the NSS Save the Caves Fund or a cave conservancy in your state.

**Cave Safety** The best way to experience a cave for yourself is to visit one of the many caves open to the public in the US National Parks or those operated privately. Undeveloped, or “wild” caves should be entered only by experienced cavers with the proper safety training and equipment.

## Suggested Reading

Available from the NSS Bookstore

*Living with Karst*, by George Veni, Harvey DuChene, Nicholas Crawford, et. al., American Geological Institute  
*Outdoor Skills and Ethics - Caving*, by Leave No Trace, Inc.  
*Dark Life*, by Michael Ray Taylor  
*Cave-Processes, Development and Management*, by Dave Gillieson  
*Guide to Responsible Caving*, by Ed Sira (available at no charge from the NSS Office)  
*America's Neighborhood Bats*, by Merlin Tuttle

## Young Readers

*Caves! Underground Worlds*, by Jeanne Bendick  
*Journeys into the Earth*, by Barton, Holler-Allenbach, Delano

## For Educators

*Project Underground Workbook*, edited by Carol Zokaites

## On the Internet

The National Speleological Society (NSS): [www.caves.org](http://www.caves.org)  
The National Caves Association (NCA): [www.cavern.com](http://www.cavern.com)  
Bat Conservation International (BCI): [www.batcon.org](http://www.batcon.org)  
National Park Service Caves: [www2.nature.nps.gov/grd/tour/caves.htm](http://www2.nature.nps.gov/grd/tour/caves.htm)  
National Cave and Karst Management Symposium: [www.nckms.org](http://www.nckms.org)

The National Speleological Society (NSS) is the largest organization in the world dedicated to protecting, conserving, exploring, and studying caves. The **Save the Caves Fund**, supported solely through donations, provides essential funding for cave conservation and restoration, karst resource management training, and educational programs. For more information visit the NSS website or contact the NSS office.

## National Speleological Society

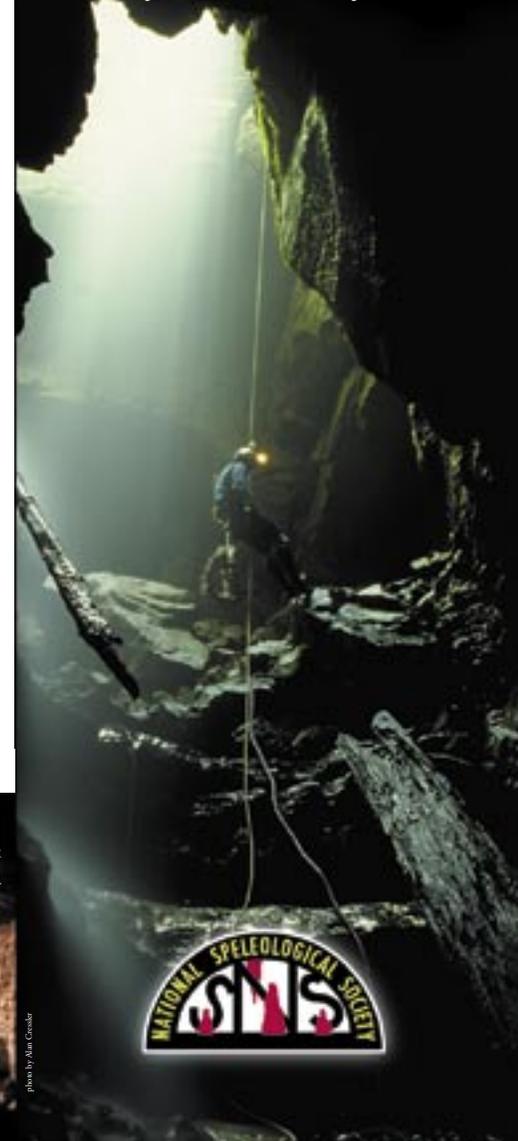
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NSS Conservation Committee

\* George Veni, Harvey DuChene, Nicholas Crawford, et. al., *Living with Karst*, (AGI: 2000) 5. Used with permission.

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DEDICATED TO THE EXPLORATION, STUDY AND CONSERVATION OF CAVES

## Discovering Caves Fragile Underground



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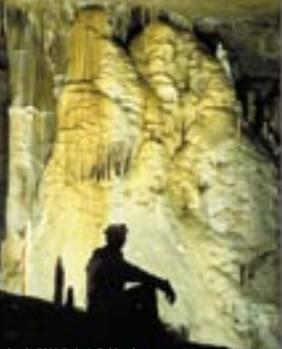


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