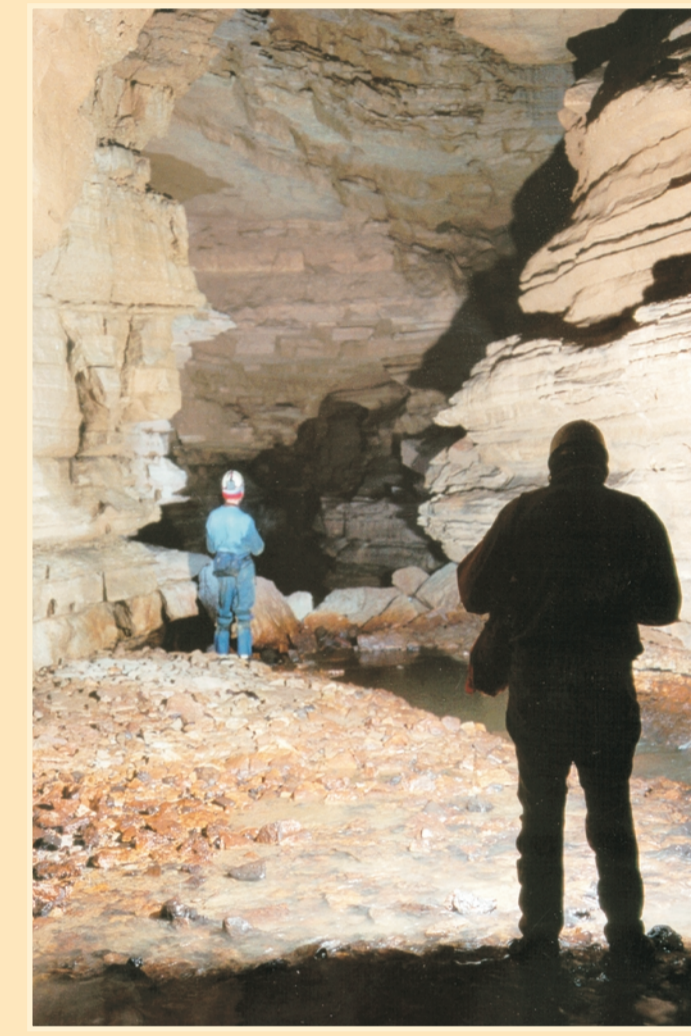


Protect Kentucky's Karst Aquifers from Nonpoint-Source Pollution

James C. Currens



Stream flowing through a cave.

What Is a Karst Aquifer?

Much of the ground water in Kentucky is stored in karst aquifers. An aquifer is a body of sand, gravel, fractured bedrock, or other earth material that can provide enough water from a well or spring to supply a household. A karst aquifer is limestone (or other easily dissolved rock) that has been partly dissolved so that some fractures are enlarged into passages (called conduits) that carry the ground-water flow. Karst aquifers are susceptible to pollution because runoff can

enter these conduits through sinkholes and swallow holes (depressions into which a stream disappears underground) without the benefit of being filtered through sand, gravel, or even soil. The water flows very quickly through the aquifer, which doesn't allow much warning time for ground-water users downstream of a pollution incident.



Large sinking stream.



Trash thrown into a sinkhole.

What Is Nonpoint-Source Pollution?

Pollution that comes from widely distributed sources instead of from a single discharge pipe or other easily identified point of discharge is called "nonpoint-source pollution." It's also called "runoff pollution."

Examples of nonpoint pollution sources are runoff from golf courses, soil washed from farm fields and construction and logging sites, animal waste from feedlots, waste from home septic tanks, pesticides from lawns, trash dumped in sinkholes, and fertilizers.

To keep ground water safe to use, pollution must be kept out of the karst aquifer. Nonpoint-source pollution is difficult to keep out of aquifers because regulations and technical solutions are difficult to apply when a specific source cannot be identified. Personal responsibility of all citizens living in karst areas, especially those handling or disposing of potential pollutants, is the best remedy.

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How Does a Karst Aquifer Become Polluted?

Here's an example of how nonpoint-source pollution can contaminate an aquifer. On a hot, humid afternoon, a hiker stops along the trail at a limestone spring to refresh herself. She dips her cup into the pool and takes a long, deep drink. The water is clear, cold, and refreshing. "Ah," she says, "that tasted good!" A few hours later she'll be wondering why she's so sick.

What she doesn't know is that bacteria or chemicals have been transported to the spring from a sinkhole many miles away. Every time it rains, pollutants from sources near the sinkhole, such as urban development or animal pastures, quickly flow with no filtration through conduits to the spring. Sinking streams and swallow holes can take surface water directly underground. Not only do dissolved pollutants and suspended particles get carried underground, but cans, bottles, tires, home appliances, barrels, and even whole automobiles find their way into caves.



Clear, cold spring water can be inviting to drink.



Cattle in sinkhole pond.



Photo by James Rehmman

Trash and runoff from lawns and streets find their way into sinkholes in urban areas.

Why Are Karst Aquifers Important?

Although karst aquifers are vulnerable to pollution, in Kentucky they're an important source of water for agriculture and drinking water.

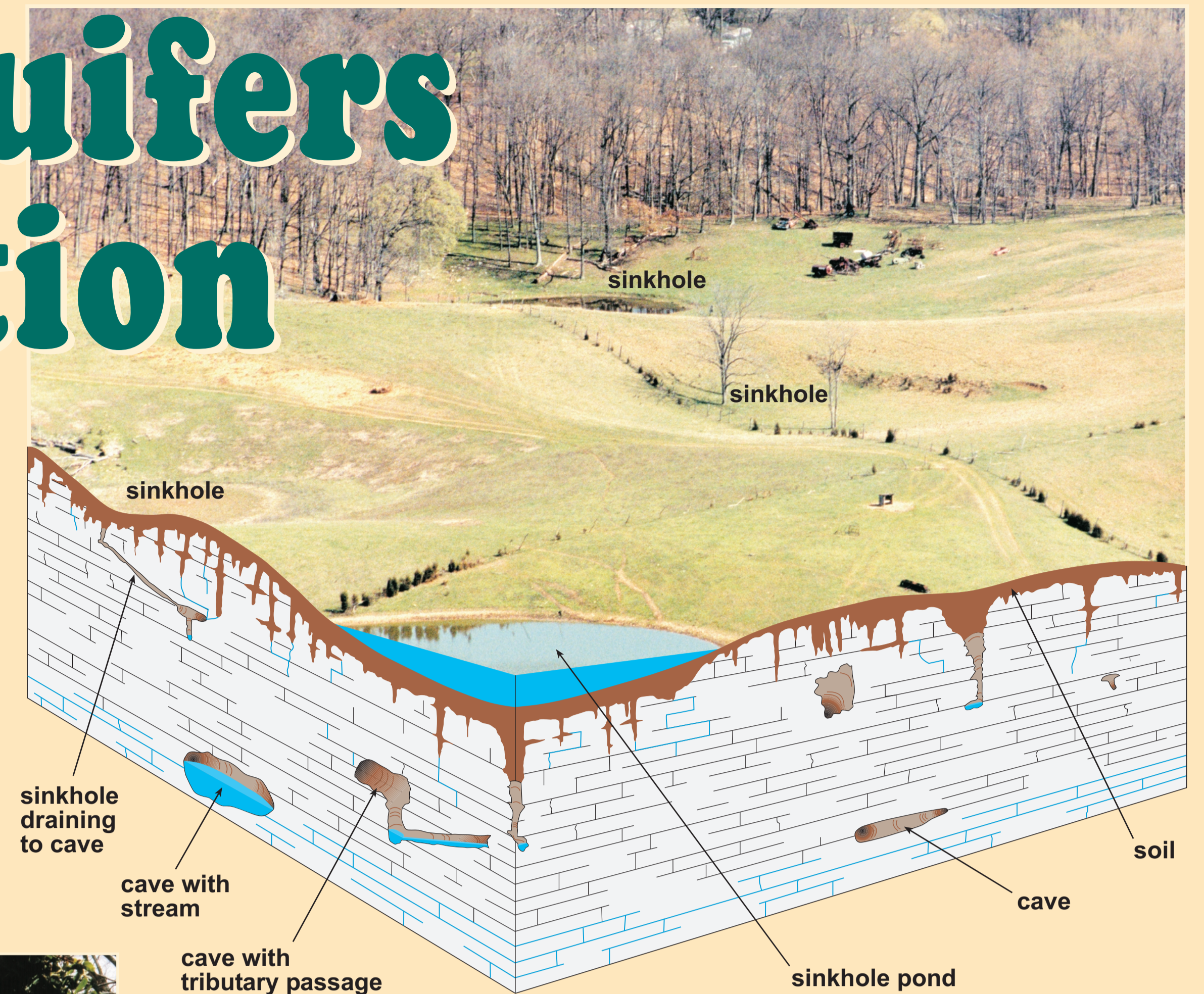
It's also important to protect the watersheds of springs that are not used directly for human needs. This is because they provide a significant percentage of the flow of surface streams. In fact, water from karst springs maintains the flow of many creeks and streams during drought. The water quality of a spring may influence the water quality of the stream into which it flows, as in the example to the right.



Impounded spring used for a public water supply.



The rare Kentucky cave shrimp (*Palaemonias ganteri*) is an endangered species that lives in karst aquifers.



How Can You Protect Karst Aquifers?

- ▶ **Never use sinkholes as dumps. All waste, but especially pesticides, paints, household chemicals, automobile batteries, and used motor oil should be taken to an appropriate recycling center or landfill.**
- ▶ **Make sure runoff from parking lots, streets, and other urban areas is routed through a detention basin and sediment trap to filter it before it flows into a sinkhole.**
- ▶ **Make sure your home septic system is working properly and that it's not discharging sewage into a crevice or sinkhole.**
- ▶ **Keep cattle and other livestock out of sinkholes and sinking streams. There are other methods of providing water to livestock.**
- ▶ **See to it that sinkholes near or in crop fields are bordered with trees, shrubs, or grass "buffer strips." This will filter runoff flowing into sinkholes and also keep tilled areas away from sinkholes.**
- ▶ **Construct waste-holding lagoons in karst areas carefully, to prevent the bottom of the lagoon from collapsing, which would result in a catastrophic emptying of waste into the aquifer.**
- ▶ **If required, develop a ground-water protection plan (410KAR5:037) or an agriculture water-quality plan (KRS224.71) for your land use.**

An excellent example of a farming practice that protects the karst aquifer. The sinkhole is free of trash and farm waste, and livestock are kept out of the sinkhole by the fence.



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