

Karst Topography

What is Karst Topography?

Karst topography is a special type of landscape that is formed when layers of limestone or dolomite bedrock dissolve as water seeps into them. This causes small **caves** and **fissures** to form in the rock. Many karst regions display distinctive surface features, with **sinkholes** being the most common. Natural features of the landscape such as caves and **springs** are typical of karst regions. Karst landscapes are often spectacularly scenic areas.

In the United States, 20 percent of the land surface is karst. In northeast Iowa, we are fortunate to have stunning and unique karst features accessible for observation, study, or recreation. Dunning's and Malanaphy Springs, Ice Cave, and our coldwater trout streams are all evidence of this phenomenon right here in Winneshiek County. Coldwater Cave, Iowa's longest and most spectacular cave, is located deep beneath the gently rolling hills of the county. Although public access is not allowed, the cave (with over 17 miles of passages!) has been studied and much information exists on this treasure. **Algific talus slopes** (see below) are another rare and fascinating feature found in the regions.

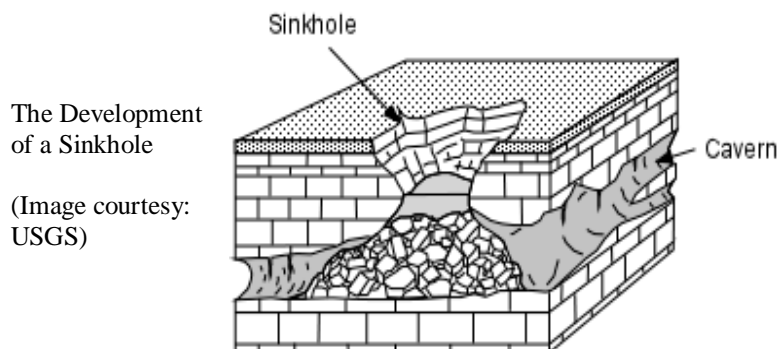
What's So Special about Karst Formations?

Karst regions contain **aquifers** that are capable of providing large supplies of water. More than 25 percent of the world's population either lives on or obtains its water from karst aquifers. In fact, 40 percent of the groundwater used for drinking in the U.S. comes from karst aquifers. Plus, Karst landscapes are often spectacularly scenic.

Why Study and Protect Karst Formations?

In addition to appreciating the beauty of these formations, it is important that we understand how they function, especially in relationship to other land formations. When the limestone in a karst formation dissolves, it creates caves that can then collapse and form sinkholes. The caves in karst areas are very specialized habitats and may contain unusual organisms that need to be protected while we learn more about them and their function. This all becomes important as we build structures and roads in our area.

Perhaps the most critical environmental issue related to karst terrain is water quality and supply, since karst aquifers provide a large portion of the water supply for this country. Due to the fractured nature of the rock in karst areas, contaminated groundwater can very quickly pass into water supplies without the usual filtering effect of unbroken ground layers. This presents a challenge to land use in areas that drain into karst formations. We must consider how we can safely use the land to protect our water supplies.



Resources:
Karst Waters Institute
www.karstwaters.org

Algific Talus Slopes

Algific talus slopes, a relatively rare geological phenomenon, can be found in the Driftless Area of northeastern Iowa, which extends as well into Minnesota, Wisconsin, and Illinois and which was not covered by the most recent glaciers. **Algific** (cold air) **talus** (loose rock) slopes are created when ice caves and airflow interact to produce areas which are warmer than usual in winter and cooler in the summer. This provides unique habitats for some rare and unique plants and animals that are usually found in a more northern environment. The Iowa Pleistocene Snail, once-thought extinct, was rediscovered in the 1980s in these unique microclimates. Algific talus slopes are small, isolated, and tend to occur on steep north- or east-facing hillsides. They are very rare and very fragile, and have been declared by the world's scientific community a globally threatened and endangered habitat.

There are a number of these cold air slopes in Northeast Iowa that are accessible to the public. You can visit the "ice caves" at Bixby State Preserve, north of Edgewood, Iowa. There is also a small slope next to the Riverside Trail below the bluffs of Phelps Park in Decorah. During the winter, many ice cave air vents are obvious as you drive around the area. Just look for the mist as the warmer cave air meets the cooler outside air. If you decide to visit one of these spots, it is important to consider the delicate nature of these sites. Do not walk on them, or move/remove any of their structure (rocks, plants, animals, etc.).

During the winter, sub-zero air descends through fissures and sinkholes and super cools the bedrock deep in the earth. During the spring, snowmelt and rainwater seep through the surface soils to the cold bedrock, where the water freezes in massive veins and blocks. With the summer heat, the bedrock warms enough to melt some of the ice and produce chilled water vapor. The deep shale layers prevent the water vapor from sinking further into the earth. The vapor escapes through fissures and cracks in the limestone. Evidence of this process is observed on algific talus slopes as a flow of cool air usually between 37 and 45 degrees in the midst of the summer heat. The outflow of cool air draws in warm, outside air through sinkholes which continues the process of producing water vapor. During winter the process is reversed. The now warmer bedrock air rises out of sinkholes and fissures. The colder winter air is drawn into the caves to maintain the ice.

The current threats to these sites are primarily grazing, sinkhole filling, and invasive species. Any disturbances to the slopes can interfere with the airflow. Protective action needs to include the areas where cold air flows to the surface, and also those areas upslope that permit the infiltration of water which result in the ice bed.

Resources:

Iowa Natural Heritage Foundation. www.inhf.org

The Nature Conservancy. www.nature.org

Iowa DNR. www.iowadnr.gov

University of Northern Iowa. <http://www.uni.edu/museum/exhibits/permanent/environment.html>

Karst topography and algific talus slopes are fascinating topics to study with your students. However, activity pages have not been included with this guide due to the sensitive nature of these formations. You may decide to include a journal or observation page for your students after you discuss the fragile but essential nature of some of the ecosystems associated with karst topography.

Contact Winneshiek County Conservation staff to visit other algific talus slopes within county parks.