

SINKHOLE AWARENESS



What is a sinkhole?...a localized collapse or subsidence of bedrock and/or soil. Sometimes a break in soil is visible, which indicates a "cover-collapse" sinkhole. A "closed depression" is another type of sinkhole where the ground cover hasn't collapsed, but where the subsurface is likely to be relatively unstable and water may flow very quickly into bedrock aquifers.

A unique type of sinkhole in our area is called a "swallow-hole" or "swallet". These features develop near the base of our mountains, and often transmit vast quantities of stormwater runoff directly into bedrock aquifers.



Sinkholes develop in areas that have bedrock that can dissolve in water (such as limestone or dolomite), also known as "karst" areas. The combination of slightly acidic precipitation or surface water runoff, karstic bedrock, and time gradually result in complex, elaborate sculpting of bedrock, development of caves and sinkholes, and "robbing" of water flow from surface streams into underground flow systems.



Where does all the water go? One of the remarkable, natural characteristics of karst watersheds is the presence of high flow-rate springs, such as this spring near Pleasant Gap. Entwined with the natural beauty of these springs is a high level of potential vulnerability to contamination from improper chemical or waste management.



DON'T TRY THIS AT HOME !!! In the past, residents of karst areas have often found it convenient to dispose of trash in sinkholes. Today, we have a better understanding of the health effects of improper waste disposal practices, and volunteer time is well-spent in removing trash from sinkholes.

For example, this full, one-quart container of herbicide was removed from a sinkhole in the Spring Creek Watershed. Calculations using current public health protection standards indicate that the contents of this container could make the drinking water supply for one person unfit to drink for 1,500 years !!!

The **Spring Creek Watershed Community** coordinates sinkhole cleanup projects—We'd love to have your help !!!



Pesticides and oils that can contaminate our source of drinking water were found at a number of locations in the April cleanup. Here is a full can of the herbicide WEEDON retrieved along with many other containers that once were filled with chemicals dangerous to our water supply.

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Sunday, May 10, 1998

This SINKHOLE AWARENESS poster is produced by
The Spring Creek Watershed Community
Please consider volunteering—call us at (814) 237-0400.



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Where do sinkholes occur in the Spring Creek Watershed?

The PA Bureau of Topographic and Geologic Survey publication "*Sinkholes and Karst Features of Centre County*" (*Open File Report 9201*) shows the locations of many sinkholes and closed depressions in our area.

Sinkholes form as the result of interaction between bedrock, soil and water. Here's a breakdown of 277 sinkholes in Centre County by bedrock formation, as identified by the PA Topo/Geo Survey:

<u>BEDROCK FORMATION</u>	<u>% OF MAPPED SINKHOLES</u>
AXEMANN	1.4 %
BELLEFONTE	0.4 %
BENNER THROUGH LOYSBURG	0.4 %
COBURN THROUGH NEALMONT	28.9 %
GATESBURG	4.7 %
GATESBURG, LOWER MEMBER	4.0 %
GATESBURG, MINES MEMBER	9.7 %
LOYSBURG	27.4 %
NITTANY	7.6 %
REEDSVILLE	0.4 %
STONGEHENGE/LARKE	15.2 %

What causes sinkholes to collapse?

Sinkholes collapse because the support of soil and rock has been removed from the subsurface. Before the collapse, cavities or voids develop in the subsurface, with the roof of the void supported by distribution of the weight of the overlying material down along the walls of the void. Eventually the void becomes so large that the weight of the overlying material exceeds the ability of the soil/rock mass to support the roof of the void, and the roof collapses.

Can sinkholes be prevented ?

Yes and no. Some sinkholes are caused by man's alteration of the natural infiltration of water into the ground. If the natural infiltration rate is altered, vertical erosion of soil and sinkhole formation may result. In this case, sinkholes can be prevented by minimizing the change in natural infiltration. Other causes of man-induced sinkhole collapse include groundwater withdrawal and some construction activities.

Some sinkholes are formed by the removal of soil and rock by water flowing in underground karst conduits; this is a natural process that generally can't be easily prevented or controlled.

What can be done if a sinkhole forms?

First, make sure that no-one is in danger of being hurt. The soil in and near active sinkholes can collapse without warning.

If necessary, sinkholes can be repaired in a number of ways, depending upon the need to protect nearby structures or other features. There is no "best" way to repair a sinkhole; most repairs include excavation of the sinkhole "throat", placement of durable materials (such as rip-rap) in the sinkhole void, and mitigation of the conditions that led to the formation of the sinkhole (such as stormwater discharges, broken pipes, etc.).

How are sinkholes related to groundwater quality ?

Water is naturally purified as it passes slowly through soil. Where soil cover is thin, groundwater may not be filtered sufficiently to remove surface contaminants (such as disease-causing organisms, etc.). Surface water that enters a sinkhole passes directly into the groundwater reservoir without any filtration. In addition, contaminants that enter a sinkhole are carried away from the sinkhole at a very high rate of speed.

What can I do about sinkholes?

Most of all, be careful with fuels, fertilizer, chemicals, and waste material. Don't put anything in a sinkhole that you wouldn't want to have in your drinking water.

How can I find out more about sinkholes?

The Pennsylvania Bureau of Topographic and Geologic Survey produced a publication titled "*Sinkholes in Pennsylvania*" (*Educational Series Report #11*). You can view or download a copy of this publication at the website:

www.dcnr.state.pa.us/topogeo/pub/pub.htm

Also check out the PA Topo/Geo Survey homepage:

www.dcnr.state.pa.us/topogeo

USGS Circular 1182 (part III) discusses sinkholes;

www.water.usgs.gov/pubs/circ/circ1182/

We have also compiled a CD-ROM of karst information (sinkholes, water quality protection, etc.) that is available for a small donation; please call us at (814) 237-0400 to request a copy.

The Spring Creek Watershed Community is a watershed-based, volunteer organization of over 2000 members that promotes actions that protect and enhance the quality of life, environment and economy throughout the watershed while maintaining and improving the high quality of Spring Creek and its tributaries. Projects of ***The Spring Creek Watershed Community*** are supported by the ***ClearWater Conservancy***, a non-profit corporation.

The Spring Creek Watershed Community

PO Box 163

State College, PA 16804

(814) 237-0400