Land Subsidence

Land subsidence *is the sinking, or depression of the land surface.*

Land subsidence is an issue in the Northeast, though more often in the Appalachian/Piedmont and Inland Basin regions. Mines and carbonate rocks are the primary causes of land subsidence. The large amount of underground excavation during mining, especially the coals of western Pennsylvania and Maryland, has left large areas beneath the surface empty or filled with loose sediment. The empty spaces and sediment fills are sometimes unable to wholly support the weight of overlying rocks. As a result, the overlying rocks and soil sag or sink downward to create a depression in the land surface. In extreme cases, the overlying rocks collapse completely or the subsidence causes a landslide.

Carbonate rocks *include limestone, dolostone and marble.*

see Rocks, p.41

Areas of the Northeast underlain by ***carbonate rocks***, in particular the Valley and Ridge region of the Appalachian/Piedmont, are susceptible to land subsidence. Rainwater, which is naturally slightly acidic and becomes more acidic after passing through acidic soils, is capable of breaking down carbonate rocks. Within a carbonate rock layer might be caverns, widened fractures, and spaces that make the layer an unstable support for overlying rocks. Similar to mine collapses, the overlying rock in a carbonate area has a high potential for collapsing and creating sinkholes *(Figure 8.4)*.

Land subsidence can cause major problems, particularly in urban areas where sewer systems, water lines, and gas pipes can be damaged due to the sagging ground surface. In places where the surface collapses, buildings and roads can be badly damaged. Sinkholes also provide a fast drainage from the surface to groundwater, increasing the chances of polluting groundwater supplies.

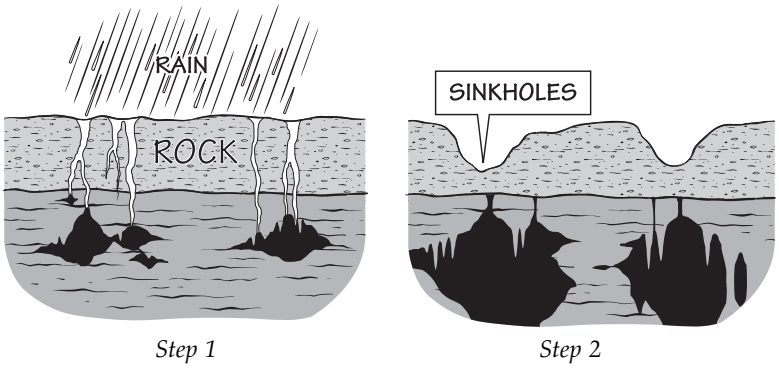
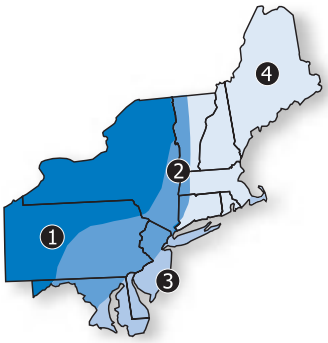
Figure 8.4: Naturally acidic rainwater creates cavities within carbonate rock, making the overlying rock unstable (left). As the cavities enlarge, the overlying rocks collapse to form a sinkhole (right). Figures by J. Houghton.