Towards a Comprehensive Sinkhole Classification Scheme for Land Use Planning

Wil Orndorff
Joey Fagan
Virginia Karst Program
Virginia Division of Natural Heritage

Abstract

As awareness of karst grows throughout Virginia's land use planning community, the need has arisen for tools to assist planners in evaluating and ranking karst features. A classification scheme for sinkholes is one such tool. Concern over impacts to and from sinkholes exists in a variety of arenas including nutrient management, storm water management, highway and utility corridor construction, on-site waste disposal, wildlife habitat protection, and stream protection. In many counties, development is practically restricted to karst areas and planners need to prioritize most sensitive karst features for protection. Furthermore, as cost-share programs increasingly address karst issues, it is critical that agencies expend these limited funds where they can do the most good. The Sinkhole Classification Scheme under development by Virginia Karst Program staff rates the environmental significance of sinkholes using six intrinsic and three extrinsic factors. Intrinsic factors are (1) connection to surface hydrology (larger watersheds and channeled drainages are worse), (2) shape of sinkhole (sensitivity increases with slope), (3) morphology of the sink bottom (openings or secondary collapses are red flags), (4) degree of vegetation (lack of vegetation is problematic), (5) exposure of subsurface material (exposure of soil indicates active erosion; bedrock exposure may provide a direct connection to groundwater), and (6) drainage (permeability) of sinkhole. Extrinsic properties are (1) proximity and geometric relationship to other sinkholes (sinkholes in belts reflect major subsurface conduits), (2) biological significance (sinkholes near rare, threatened, or endangered species prioritized), and (3) relationship to drinking water supplies (sinkholes connected to drinking water supplies are prioritized).