



# Online tool used to assess karst environments

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**M**ajor flooding. Sinkhole collapses. Groundwater pollution. These are some of the phrases that come to mind when thinking about problems that arise from human-environment interaction in karst landscapes. The word "karst" often elicits confused looks, as much of the general public is unfamiliar with the term. However, most people are familiar with terms like caves, springs, and sinkholes, particularly in south central Kentucky, where they are fairly ubiquitous. These natural landforms occur in karst landscapes when limestone bedrock is dissolved away over thousands of years from carbonic acid (formed when rainwater mixes with carbon dioxide from the atmosphere and soil and becomes slightly acidic).

If one were to stop reading now, he or she would know more about the karst environment in which WKU and its surrounding communities are situated than most residents. Yet, this is only part of the story. Considering that karst landscapes comprise 15% of the

Earth's continents, population growth and development continue to pollute, destroy, vandalize, exploit, and heavily modify these fragile ecosystems. More importantly, karst aquifers provide over 25% of the world's fresh water supply, a resource that is easily misused and polluted. Everything from paving parking lots to applying herbicides and pesticides to withdrawing groundwater for industrial or residential use impact karst aquifers, sometimes beyond rehabilitation.

By now, alarm bells should be sounding for policymakers to address these issues with rigor. However, research indicates that few people living on karst terrain know about what is occurring within their own communities. Those who are aware often do not know how to evaluate and measure these occurrences. Supported with funding from the WKU ALIVE Center, WKU geography faculty Drs. Jason Polk and Leslie North initiated a venture to develop an online tool to assist community stakeholders in both learning about and assessing the impacts to their

karst environment. The tool's ultimate goal is to create an international online community of citizen scientists to share data.

In 2005, research efforts to quantify the total amount of karst disturbance from human impacts resulted in the creation of the Karst Disturbance Index (KDI) by Drs. Van Beynen and Townsend, which uses environmental indices to systematically evaluate and score indicators of anthropogenic karst impacts. Karst experts have applied the KDI in multiple international locations, with the primary revision being to refine its scoring criteria. However, it was not until 2010, when WKU geoscience alum Brandon Porter applied the KDI to Arecibo, Puerto Rico, that the difficulties in applying this assessment tool and its limitations for use by non-experts were documented. Porter suggested that in order to achieve its intended goal of use for land managers, policymakers, scientists, and members of the general public, "there needed to be more guidelines and education about both



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*~Dr. Chris Groves*

the data collection and analysis processes, and that an online format would be most accessible to community stakeholders in karst environments.”

To further examine Porter’s conclusions, former WKU Gatton Academy student and a non-expert in karst science, Victoria Allen, began applying the KDI to Warren County, KY in early 2011. Through this process, and with the guidance of community partners including Mammoth Cave National Park, Lost River Cave and Valley, and the City of Bowling Green, she determined that a primary limitation in applying the KDI was knowledge about types and locations of data sources. Allen noted, “Karst is complex and data are not easily found unless you are familiar with what to look for and where to find it. Even then, scoring the KDI indicators is

tough without knowing a lot about karst science.”

After discussions with Polk and North, the direction of the online tool evolved to focus on describing karst landscapes and assessing available data for scoring indicators, both achievable through educational materials and a step-by-step guide to collecting and analyzing karst data. Through collaboration with website designer and WKU geoscience graduate student Taylor Hutchison, along with Hoffman Environmental Research Institute graphics artist Jonathan Oglesby, the “uKarst” online tool was developed.

This tool engages communities all over the world by providing both a forum for sharing knowledge, data, and resources, as well as a user guide and methodology

through which interested stakeholders can assess the availability of karst disturbance data. Karst expert Dr. Chris Groves commented, “This online tool will be especially important to international communities who face challenges from human impacts on karst groundwater, yet often lack the expertise to address these complex issues – knowing which data to collect and where to find them is an important first step!”

A pilot version of the “uKarst” website and a corresponding smartphone app was launched for beta testing with the assistance of selected community partners, as well as international collaborators, through its unveiling at the National Speleological Society Convention in June 2012. For more information, please visit [www.ukarst.com](http://www.ukarst.com).

## Students address county schools’ immunizations

To reduce the number of unhealthy days, decrease the barriers to acute and chronic disease prevention, and provide primary disease prevention through influenza immunization of Warren County schools’ faculty and staff, the campus and community joined together to create the “Vaccinate Your Staff” campaign.

In 2010, no school in the Warren County school district achieved 50% staff immunization for seasonal flu, according to L.I.V.E. coalition surveillance. Unlike personnel in traditional office work sites, it is difficult for teachers and school staff to leave the worksite for an hour or more to go to a preventative health appointment, such as an immunization. The “Vaccinate Your Staff” campaign addressed this issue with an innovative approach – bringing the preventative service to the staff.

Free flu shots were offered to the staff of the Warren County school system

in September 2011. The staff of the Institute for Rural Health gave the immunizations with assistance from WKU nursing students. This program involved a partnership between the Warren County school system, the Institute for Rural Health Development and Research, the South Central Area Health Education Center (AHEC), and the L.I.V.E. Coalition.

The objective of the campaign was to increase the immunization rates among the staff of the Warren County school system by eliminating the barriers of cost and time. A total of 1,187 staff members out of a possible 2,215 from the school system signed up to participate in the campaign. Of those that signed up, 974 received a free flu shot. This was a participation rate of 43%, a 2% increase from the previous year.

In order to determine what the motivating factors were for those that did or did not decide to participate in the campaign, an online survey was conducted in May

2012. A total of 366 people responded to the survey. Fifty-nine percent indicated that the free flu shot was their reason for participating. Thirty-seven percent indicated that the convenient location was their reason for participating. For those who did not participate, reasons included having received a flu shot prior to the contest and being medically unable to receive a flu shot.

This project addressed three goals of the United States government’s “Healthy People 2020” campaign: 1) Attain high quality, longer lives free of preventable disease, disability, injury, and premature death, 2) create social and physical environments that promote good health for all; and 3) promote quality of life, healthy development, and healthy behaviors across all life stages. The project also directly targeted the “Healthy People 2020” main goal to “increase immunization rates and reduce preventable infectious diseases.”