MAINSTREAMING KARST EDUCATION, OR KARST EDUCATION FOR EVERYONE

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Abstract

I will discuss matching karst education to state educational programs, professional development programs, and regional grant programs. Several success stories are highlighted. Education is a very important part of karst protection and being part of the general education program should be a goal for all karst states.

The Virginia karst education program participates in a strong environmental education network in Virginia and a program called Virginia Naturally. Virginia's statewide education system has several science standards on karst topography and groundwater, required on science tests, which are taught with Project Underground activities. Teachers are awarded continuing education credits towards licensure certifications for attending classes and workshops on karst issues. Funding is provided though NOAA grants for Chesapeake Bay education classes and conferences on karst. Many county school systems across Virginia include karst education in their teaching programs. This presentation will provide ideas other states can use to implement karst education into their general education programs.

Key Words: karst education, Virginia karst education standards

Introduction

Education is an important part of any natural resource protection plan. It is hard for people to protect something they do not understand. Education is especially important to karst protection since karst is an unfamiliar topic to most people. By making karst education available to the students, citizens and agency personnel in karst areas they will gain the knowledge to help protect this valuable and unique resource.

Introducing Karst into Education

There are many ways to introduce karst science into a statewide education system. Instead of just teaching about caves, find ways to match concepts from karst science to the education standards already in place. Virginia does have an earth science standard on karst topography specifically, but there are many other options available for teaching about karst science. Look for standards on groundwater, surface waters, geologic processes, rare or endangered species, habitats, species adaptations and, of course, bats. By using things like cave habitats and karst hydrology to teach general science concepts the students are introduced to karst science. Here is an example of a Virginia Earth Science teaching standard, note the wording and the various topics in this standard that could include karst issues.

Table 1 Virginia Karst Education Standards

ES.9 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans.	
(a)	processes of soil development
(b)	development of karst topography
(c)	identification of groundwater zones
(d)	identification of other sources of fresh water including rivers, springs, and aquifers
(e)	dependence on freshwater resources and the effects of human usage on water quality
(f)	identification of the major watershed systems in Virginia including the Chesapeake Bay and its tributaries

Using up-to-date teaching methods is also important for working with established education systems. One method, inquiry teaching, works great for teaching science (Moyer 2007). Inquiry teaching methods have the students doing activities first so they can discover the concepts for themselves, then the teacher teaches or explains the lessons and concepts the students needed to learn. Project Underground is a learner-focused, karst-education curriculum that can be used to teach karst science (Zokaites 2006). The activities are hands-on and can fit into the inquiry-teaching methods used in many science classrooms (Zokaites 2007). For more information on the Project Underground program see the web page for Project Underground, Inc. (2008). For information on how Virginia educators use the Project Underground program, including the Project Underground activities correlated to the Virginia Science Standards, see the web page for the Virginia Department of Conservation and Recreation (2008).

Working karst education into existing, educator-training structures is also important. Offering professional development activities for teachers through the Department of Education and local school systems is a good way to provide teaching materials to teachers. One-day workshops can be used to introduce karst science to teachers and provide them with the Project Underground materials. This is a great way to provide teachers with the knowledge needed to teach karst science in their classrooms. Teachers will also receive continuing education credits for attending these workshops. In Virginia, and several other states in the eastern U.S., one focus of education is on protecting and restoring the Chesapeake Bay. This is a good focus to include karst concepts since many of the rivers running into the Chesapeake Bay have headwaters in karst regions. Bay Education grants in Virginia from the National Oceanic and Atmospheric Administration (NOAA) fund several, week-long professional development workshops for teachers. One of these week-long classes is in the mountain headwaters area, and the subjects covered include watersheds, water quality, geology, karst geology and karst hydrology. The teachers also receive the Project Underground materials for their classroom use, along with several other education curricula on watersheds and the environment. The teachers are awarded 45 continuing education credits for this week-long workshop, and they can elect to receive three hours of graduate credit in Life Science. One field trip has the teachers standing in a big sinkhole, experiencing a cave entrance and visiting a karst spring. This field trip really shows the unique groundwater-to-surface water interaction in karst regions and the need to protect karst aquifers.

These same workshops and materials can be provided to agency-outreach personnel such as park interpreters, soil and water conservation district educators, foresters and wildlife managers. These staff members can also facilitate ongoing karst education. Agency staffers are called upon to give talks and programs on natural resources. Given the right materials and resources these folks can easily add karst science to their mix. Providing land planners and local government supervisors with karst information through workshops and seminars is also good for karst education and karst protection. Using karst examples for land planning and natural resources planning will help students and citizens understand the unique development problems in karst.

Project Underground has several lessons and

Figure 1 Teachers on field trip to a sinkhole.

activities on land planning. The Lost River Village activity has the participants planning a town in karst topography. Working together in teams, the participants plan roads, water supplies, sewage disposal, housing developments and community structures including schools, fire stations, stores and restaurants.

The Virginia Naturally Program, a statewide network for environmental education, helps facilitate the training and resources needed by agency-outreach personnel and educators to teach many of the subjects in environmental education, including karst education. This program is a partnership of businesses and organizations offering to help the environment and includes many of the natural-resource agencies and environmental-education programs. Visit the web site for the Virginia Naturally Program (2008).

Summary

Karst education is an important part of general karst protection in any state. There are many ways to involve students and the general public in karst-education programs. Citizens must become aware of the impact that human development can have in karst topography, and understand the need to protect this unique resource. Including karst education as part of the general education program should be a goal for all karst states.

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