

got karst?

Karst Partnership Forum

National Speleological Society

Winter 2009

NSS Conservation Division

Issue 1

Welcome

Welcome to the first issue of "Got Karst?" This newsletter serves as a tool to network communities, land use planners, land managers, and developers with organizations and resources to help protect, conserve, and study our nation's fragile karst resources. Feel free to send articles that might be used in future issues. Submit your stories of communities, developers, and organizations that forge partnerships and find solutions to protect karst in developing areas.

Communities in karst regions throughout the world are experiencing development pressures, pollution from agricultural operations, problems with subsidence, and other serious threats to vulnerable karst aquifers.

The National Speleological Society (NSS) launched the Karst Partnership Forum (KPF) at the 2006 national caving convention in Bellingham, Washington. Since its inception, KPF has garnered partner support to host both an exhibit booth and an accredited session at the American Planning Association's (APA) 2008 National Convention held in Las Vegas, Nevada and a booth at the 2010 APA Convention in New Orleans. Definite consensus among planners indicates the time is ripe to provide karst information for communities and land planners to help mitigate existing problems and engage in sound planning to avoid future development dilemmas.

Several APA members expressed a desire to work with the Karst Partnership Forum to bring regional and national attention to the importance of maintaining healthy karst environments.

Lisa Hollingsworth-Segedy, AICP, is a geologist and planner who attended the APA Convention. Currently, Lisa is the Associate



Jim Werker, Mike Walsh, Kriste Lindberg, and Gordon Birkhimer in KPF exhibit booth at American Planning Association's 2008 Convention.
photo Val Hildreth-Werker

Director/River Restoration of American Rivers. Lisa commented, "The National Speleological Society is accomplishing its mission to increase awareness about karst and open a dialogue with planners."

We hope this newsletter will broaden that dialogue and help communities protect karst ground water quality, subterranean habitats, and native microbial communities that work together to make healthy karst aquifer systems.

Visit the NSS Web site at www.caves.org to find out more about the National Speleological Society and affiliate organizations involved in the protection of karst and cave systems.

Contact the Karst Partnership Forum if your community needs assistance with a planning or development issue. We welcome your participation in KPF. As you read this newsletter and think of ways you can contribute your expertise and talent to this effort, please contact Merideth Hildreth, Coordinator of the Karst Partnership Forum at planning@cunacueva.com.

got karst?

What is Karst?

Karst is the most environmentally sensitive type of landscape. Karst systems typically contain sinkholes, springs, underground streams, and caves. Approximately 25% of the U.S. is underlain by karst. An estimated 40% of the people who use groundwater in the United States use karst groundwater.

- Karst conduits serve as recharge channels into underground aquifers.
- Karst landscapes rapidly funnel unfiltered surface pollution into groundwater.
- Karst features are biodiverse and serve as critical habitats for undiscovered biota and endangered species.
- Fragile karst sinkholes can collapse resulting in development catastrophes and loss of life.

herbicides, petro-chemical fertilizers, and coliforms from animal operations.

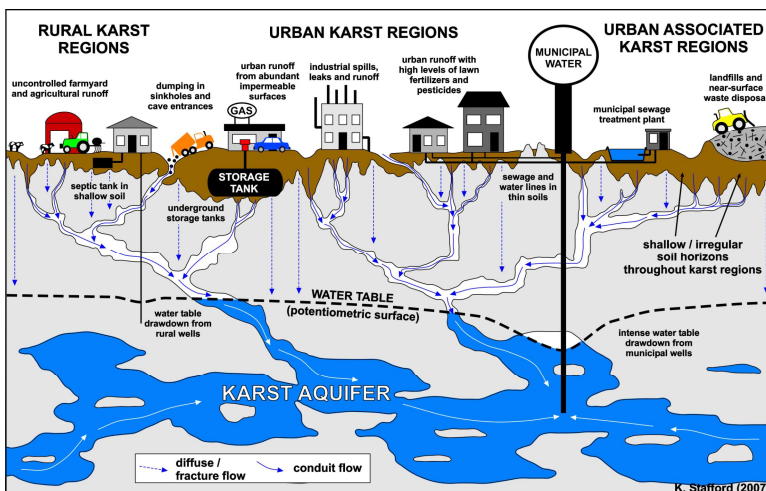
- Caves and karst systems provide habitat for subterranean species, some of which are endangered, some of which are as yet undiscovered.
- Earthmoving disturbance of the land surface and drainage patterns can cause wells to dry up, water quality degradation, loss of habitat, and negatively impact or even destroy underground ecosystems.
- Sinkhole subsidence can be economically devastating and has resulted in death-tolls in urban areas.

KPF Goals

By promoting a national dialogue among planners, communities, developers, and organizations, the NSS Karst Partnership Forum hopes to motivate careful and thoughtful planning to protect karst systems in development zones.

As this Forum forges partnerships among planners, communities, developers, organizations, and institutions, we'd like to see articles submitted to a variety of publications to increase public awareness. Let's make it our collective mission to make the term "karst" a household word and excite national media attention. Send us contact information about publications, magazines, professional journals, newspapers, radio programs, and other sources that are interested in articles about protecting karst.

In the professional arena, let's conduct sessions about planning in karst regions at venues such as the American Planning Association chapters and regional conferences, conferences attended by developers, and the State and National League of Cities and State and National Association of Counties meetings, American Landscape Architecture Association meetings, conferences for hydrogeologists and geologists, and related professions.



This cross-section by geologist Kevin Stafford demonstrates how surface activities can quickly impact a karst aquifer. Because karst is extremely porous and permeable, surface run-off undergoes very little filtration as it flows underground through fractures dissolved in soluble bedrock.

Why is Karst Conservation so Critical?

The significance of our karst-planning outreach effort is to acknowledge that:

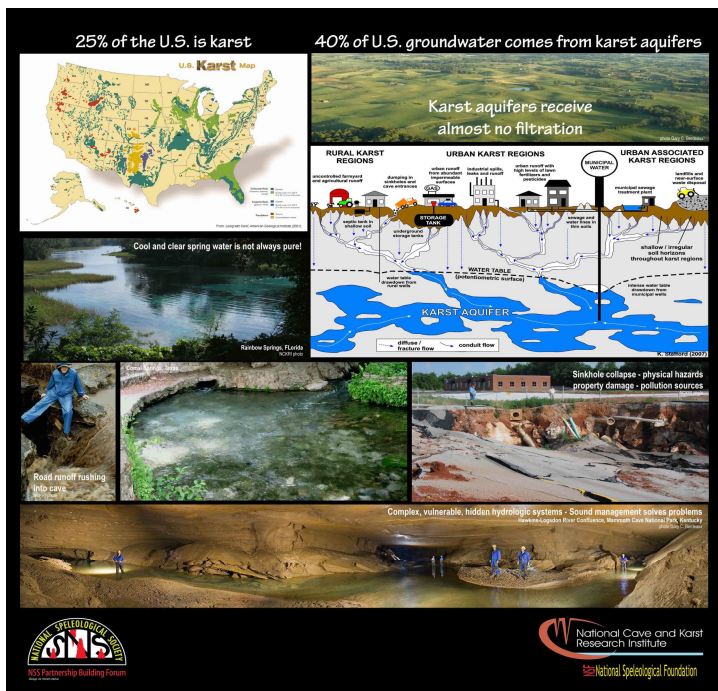
- An estimated 40 percent of our nation's groundwater supply is derived from karst aquifers.
- Karst aquifers are easily contaminated by non-point surface run-off, point-source pollution, agricultural pesticides,

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Karst Partnership Forum Accomplishments

Since it was founded in 2006, the Karst Partnership Forum has accomplished the following.

- 1) Collaboration among NSS Conservation Division Chiefs, National Speleological Foundation, National Cave and Karst Research Institute (NCKRI), Texas Cave Conservancy (TCC), NSS Karst Partnership Forum, Virginia Tech's "Growing Communities on Karst" to host exhibit booth and accredited session at the American Planning Association's (APA) 2008 National Conference (March 28-April 1).
- 2) Designed and produced an 8x10-foot museum-quality display for **got karst?** exhibit booth at APA Conference and other events.



- 3) New five-minute animation *Karst and Your Groundwater*, created by Gus Frederick with funding by NSS Conservation grants and NCKRI.
- 4) On March 30, 2008 at the APA Conference, the Karst Partnership Forum presented a professional accredited session:

"Development Solutions in Karst Regions" with five segments:

George Veni, Ph.D., Executive Director of the National Cave and Karst Research Institute, presented *Karst Groundwater: A National Treasure, A National Crises*. Veni addressed karst hydrology, pollution impacting karst aquifers, and planning recommendations to avoid karst problems.

<http://www.nature.nps.gov/nckri/>

Jesse Richardson, Jr., J.D., Assistant Professor and Interim Chair of the Department of Urban Affairs and Planning at Virginia Tech presented "Growing Communities on Karst," based on a workshop series that began in the Virginias in 2004. Richardson emphasized the importance of engaging stakeholders in the planning process in karst regions. He stressed the point that community leaders, landowners, developers, and planners need a better understanding of the fragile, vulnerable nature of the karst terrain where they live and work.

<http://www.uap.vt.edu/faculty/richardson.html>

Mike Walsh, President of the Texas Cave Conservancy, produced an 8-minute PowerPoint® slide show with voice-over interviews that tells the story of cave preservation partnerships in subdivisions in the City of Cedar Park, Texas.

<http://texascaves.org/>

David McGowan edited a special introductory segment of *Caves: Life Beneath the Forest* produced by Ravenswood Media, Inc., shown during the session. To view film clips of cave life (blind white crayfish, bats, cave salamander pseudoscorpian, cave fish, microbial life) visit <http://www.cavebiota.com/>

<http://www.cavebiota.com/dvd/dvdcover.htm>
<http://www.ravenswoodmedia.com/>

Merideth Hildreth, Coordinator NSS Karst Partnership Forum, invited the American Planning Association to collaborate with the NSS to develop strategies to better maintain healthy karst environments.

- 5) KPF has established a Speakers Bureau to connect local planning departments in karst regions with cavers across the country.
- 6) First Issue of **got karst?** newsletter distributed to Karst Partnership Forum including planners who signed up for the forum.
- 7) Forging dialogue with planners across the nation to instigate proactive strategies and policies to protect karst and karst aquifers.
- 8) Established working partnership with E. Spencer Fleury, Ph.D., and Todd Chavez, M.A., University of South Florida, to post karst protection ordinances and management plans to the Karst Information Portal (KIP).

Land Use Policy and Practice in Karst Terrains

E. Spencer Fleury at the University of South Florida wrote his 2007 dissertation *Land Use Policy and Practice in Karst Terrains*. This work as well as several other cave and karst related dissertations are posted on the Karst Information Portal Web site under Resources <http://www.karstportal.org>

Fleury's Dissertation Abstract:

Karst topography is the result of a specific combination of geological conditions, precipitation, biota, and temperature, and is characterized by the gradual solution of the underlying bedrock and the development of underground drainage routes for surficial runoff. Many of these karst landscapes are found in urbanized areas, where the potential for anthropogenic impact is quite high. In many instances, municipalities on karst terrains choose to mitigate these impacts by implementing ordinances that place restrictions on permissible land uses near karst landforms. This dissertation asks the question: are the impacts of karst-related land use regulation on human / social systems significant enough to merit consideration during the regulation writing and implementation process? In the process of answering this question, it is hoped that a broader

understanding will be developed of how land use regulations are used to control and regulate human activity on karst lands, particularly (but not exclusively) in the United States; and that the conclusions drawn from that overview might serve as the beginnings of a generally applicable framework for the development of karst regulation.

Karst Land Use Manual for the Virginias

By Jesse J. Richardson, Jr.

The Cave Conservancy of the Virginias (CCV) will soon release *Karst Land Use in the Virginias: A Manual for Policy Makers and Land Use Planners*. The manual, written pursuant to a grant from the CCV, is authored by Jesse J. Richardson, Jr., an Associate Professor in Urban Affairs and Planning from Virginia Tech, and two of his graduate students, Elisabeth Chaves, and Toby Leuter Stauffer. Chaves, a Ph.D. student at Virginia Tech, and Richardson are both attorneys. Stauffer is presently a planner for Larimer County, Colorado.

This work attempts to bridge the gap between policy makers and land use planners on the one hand, and karst scientists on the other. Land use planners and policy makers in karst areas generally lack scientific knowledge of karst and how to apply typical land use tools to karst characteristics. Land use planners and policy makers sometimes fail to communicate with karst scientists and vice versa. Karst scientists will benefit from the manual by gaining knowledge of land use planning and the various tools available to planners.

The manual describes basic karst geology and hydrology, as well as federal, state, and local planning for karst. Karst hazards are discussed. The manual then lays out the various regulatory and non-regulatory tools that may be applied to karst.

Karst Land Use in the Virginias is an unprecedented effort that the CCV and the authors hope will prompt similar efforts across

the county. The publication builds on a presentation that Jesse Richardson, George Veni of the National Cave and Karst Research Institute, and Merideth Hildreth of the National Speleological Society made at the American Planning Association's National Conference in Las Vegas in April 2008. That session was well-attended by land use planners across the country and further illustrates the importance of linking land use planners and karst scientists in addressing karst land use issues.

The authors wish to thank the Cave Conservancy of the Virginias for their generous support of this project, as well as the many karst scientists and state regulatory personnel who reviewed and gave input on the manual. Special thanks must be given to George Veni of the National Cave and Karst Research Institute, and Twila Carr and George Dasher of the West Virginia Department of Environmental Protection. For more information, contact Jesse Richardson jessej@vt.edu

Resources for Karst Protection

The Karst Partnership Forum is building a database of organizations that are involved in protecting karst. Please send information about additional organizations not listed here. Information is derived from each entity's Web site.

National Speleological Society (NSS)

With over 12,000 U.S. and international members and 200 grottos (local chapters), the National Speleological Society is a lead organization in studying, exploring, and conserving cave and karst resources; protecting access to caves; encouraging responsible management of caves and their unique environments; and promoting responsible caving. <http://www.caves.org/>



Karst Information Portal (KIP)

The Karst Partnership Forum is working with Todd Chavez and E. Spencer Fleury who work with KIP housed at the University of South Florida. KIP's goal is to serve as a worldwide information network linking scientists, managers, and explorers in order to inform research, enhance collaboration, and address policy decisions in karst environments.

<http://www.karstportal.org>

8 Rivers Safe Development, Inc.

Eight Rivers Safe Development, Inc. is a West Virginia nonprofit corporation organized for charitable and educational purposes to advocate the conservation and protection of karst, caves, and karst landscapes, and promote safe development on karst terrains. The organization is centered in Pocahontas County, West Virginia—home to some of the most beautiful wild cave and coldwater stream resources in the eastern United States. The organization is part of a growing coalition of cavers, anglers, property owners, recreation groups, and conservation organizations opposed to the regional sewage treatment plant project as currently planned and the risk of irreversible harm this project presents to the Upper Elk River watershed.

<http://www.8riverssafedevelopment.com>

1000 Friends of Florida

1000 Friends of Florida promotes healthy urban and natural places by wise management of growth and change. The nonprofit educates, advocates, negotiates and, when necessary, litigates to protect a high quality of life. This organization's Web site has excellent documents regarding natural resource management including *Protecting Florida's Springs: Land Use Planning and Best Management Practices* <http://www.dca.state.fl.us/fdcp/DCP/publications/springsmanual.pdf> <http://www.1000fof.org>

American Association for the Advancement of Science (AAAS)

The American Association for the Advancement of Science (AAAS) is an international nonprofit organization dedicated to advancing science around the world by serving as an educator, leader, spokesperson and professional association. <http://www.aaas.org>

American Cave Conservation Association

ACCA is a non-profit membership organization whose activities and proceeds are dedicated to the conservation of caves and related resources across the nation and around the world. It operates the American Cave and Karst Center in the town of Horse Cave, Kentucky. <http://www.cavern.org>

American Geological Institute

The American Geological Institute is a nonprofit federation of 44 geoscientific and professional associations that represents more than 100,000 geologists, geophysicists, and other earth scientists. <http://www.agiweb.org>

Bat Conservation International (BCI)

BCI's mission is to teach people the value of bats, to protect and conserve critical bat habitats, and to advance scientific knowledge through research. <http://www.batcon.org>

Bureau of Land Management (BLM)

The Bureau of Land Management manages nearly 800 caves in the eleven western states. A Memorandum of Understanding to develop cooperative management and volunteer agreements between the BLM, the NSS, and the Cave Research Foundation resulted from the Federal Cave Resources Protection Act proposed by the NSS and enacted by Congress in 1988. <http://www.blm.gov>

Cave Research Foundation

The Cave Research Foundation is a private nonprofit organization dedicated to: facilitating research, management, and interpretation of caves and karst resources; forming partnerships to study, protect, and preserve cave resources and karst areas; and promoting the long term conservation of caves and karst ecosystems. <http://www.cave-research.org/>

Florida Sinkhole Research Institute

The Florida Sinkhole Research Institute was founded in 1982 at the University of Central Florida in Orlando following the catastrophic impact of the Winter Park sinkhole. The Institute provides educational materials, publishes research reports, and provides technical advice on sinkhole activities and karst topography to individuals and agencies on the local, regional, state, national, and world levels. A database of more than 1,500 collapses in Florida was formerly managed by the Institute and is now managed by the Florida Geological Survey. Hard copy reports, computer based inventory of sinkholes in Florida, and audio-visual materials are used.

<http://www.cee.ucf.edu/RESEARCH/fsri/>

The Karst Conservancy, Inc.

The Karst Conservancy is a national level nonprofit land trust dedicated to protecting karst. Through a voluntary, non-confrontational approach, the objective is to significantly accelerate conservation efforts in karst areas. The Karst Conservancy protects important karst properties by directly acquiring them, holding conservation easements, and using other tools that permanently protect the land.

<http://www.karstconservancy.org/about/the-karst-conservancy.asp>

Karst Environmental Education and Protection, Inc.

The mission of nonprofit Karst Environmental Education and Protection is to develop, disseminate, and promote educational materials that address societal and scientific issues pertaining to karst, to promote the protection of karst landscapes and their associated natural resources, and to advocate for responsible, sustainable development of these dynamic and fragile natural systems.

<http://keepinc.org/Home/>

Karst Waters Institute (KWI)

The nonprofit Karst Waters Institute's mission is to improve the fundamental understanding of karst water systems through sound scientific research and the education of professionals and the public. <http://www.karstwaters.org>

National Cave and Karst Management Symposium Steering Committee

The biennial National Cave and Karst Management Symposia have been important forums for promoting, advancing, and sharing concepts in effective management of cave and karst resources for over thirty years. The NCKMS Steering Committee, composed of organizations and agencies involved in cave and karst management, is primarily responsible for ensuring the biennial symposium continues to take place. <http://www.nckms.org/>

National Caves Association (NCA)

The NCA is the organization of commercial (show) cave operators. <http://www.cavern.com>

National Cave and Karst Research Institute (NCKRI)

The National Cave and Karst Research Institute was formed by Congress in 1998. The purposes of the Institute include advancing cave and karst science and research; promoting and conducting cave and karst educational programs; and developing and promoting environmentally sound and sustainable cave and karst management practices. <http://www.nature.nps.gov/nckri/>

National Park Service (NPS)

Caves and karst features occur in 120 parks in all regions of the National Park System (81 contain caves and an additional 39 contain karst). Over 3,900 caves are currently known throughout the system. The Memorandum of Understanding between the National Park Service and the NSS is designed to secure assistance with inventories, surveys, monitoring, exploration of caves, and preservation of bat habitat. This MOU resulted from the Federal Cave Resources Protection Act proposed by the NSS and enacted by Congress in 1988. The NPS Web site has links to the following federal acts and regulations.

<http://www.nature.nps.gov/geology/caves/>

The Nature Conservancy (TNC)

The Nature Conservancy is a nonprofit conservation organization dedicated to the preservation of biological diversity globally, and devoted to the protection of areas important to the survival of rare plant and animal species and natural communities. Many caves, areas of karst, and pseudokarst topography contain delicate ecosystems that support uncommon, rare, and endangered species which are vulnerable to human impact, and also contain delicate and fragile geological, archaeological, paleontological, historical, and other features which are similarly vulnerable. <http://www.nature.org>

Project Underground (PU)

As a national awareness tool, Project Underground provides interdisciplinary instructional activities. Staff conduct workshops and in-service training programs. These materials and workshops are designed for classroom teachers, cavern, park, museum, and nature center staff, or any youth-oriented group leaders. <http://www.projectunderground.org>

United States Forest Service (USFS)

A Memorandum of Understanding between the USDA-Forest Service and the NSS resulted from the Federal Cave Resources Protection Act proposed by the NSS and enacted by Congress in 1988. Cavers throughout the nation cooperate with the USFS in cave management, protection, and conservation objectives.

<http://www.fs.fed.us>