

Waterworks

Kentucky Water Resources Research Institute at the University of Kentucky

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Bluegrass Water Supply Consortium Proposes Treatment Plant

Adequate water supply is an issue of utmost importance throughout the world, and the Commonwealth is no exception. Seasonal shifts often create fluctuations in water levels, which can lead to abundance or scarcity of this important resource. To address this issue and develop long-term solutions to central Kentucky's water issues, a group of seventeen utilities, along with the Lexington-Fayette Urban County Government, came together to form the Bluegrass Water Supply Consortium (BGWSC).



Information was provided at a BGSWC public meeting in September

After two public meetings, five public workshops, and many other gatherings, the Consortium voted on October 13th to approve a

plan aimed at maintaining adequate water supply in the region. Developed by a Maryland consultant engaged by the BGSWC, the plan calls for the building of a new treatment plant on Pool 3 of the Kentucky River. Located north of Frankfort, this plant would be managed by a new agency known as the Bluegrass Water Supply Commission and would release treated water into a new grid of pipes connecting towns in the region. Should the Kentucky River's flow drop below acceptable levels, raw water would be pulled in from the Ohio River, thus greatly reducing the impact of

droughts in the Bluegrass. The entire project is estimated to cost approximately \$330 million, a sum that could lead to an increase in water bills of approximately 25%.

Dan Hassall, assistant executive director of the Bluegrass Area Development District, has coordinated the Consortium's work since its inception and is optimistic about the project. He does caution, however, that "[t]here is money to be spent before we sell the first gallon of water." It is expected that Kentucky-American Water Co., the largest utility in the region, will assist with financing the project; however, Kentucky-American's representative to the Consortium, Linda Bridwell, has stated that all utilities concerned about their water supply should contribute.

In addition to the pipes and treatment equipment that must be purchased, the Commission itself must be formed. While the Consortium has no official structure, it is expected that some of its members will form the Commission. Members will be required to reserve specific amounts of water that they anticipate needing



A group discusses the proposal at a BGSWC open house

in drought situations; in non-drought situations, those members will be required to purchase a percentage of the drought reserve amount. For example, a 20% purchase requirement would entail the purchase of 200,000 gallons daily to ensure a reserve of one million gallons per day.

Several utilities and communities – including Kentucky-American, Winchester, Frankfort, Nicholasville, and Georgetown – already have submitted non-binding letters of intent to purchase water. Others, such as Lawrenceburg, have declined, citing customer concerns regarding rate increases as the primary factor.

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Meet the Researcher: Cathleen Joyce Webb, Ph.D.



Cathleen Joyce Webb, Ph.D.

Associate Professor & Dept. Head
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Western Kentucky University

Education

Ph.D., University of Washington, 1989
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Current Research

*Occurrence and Distribution of
Mercury in Mammoth Cave
National Park - Phase II*

The Green River Basin and Mammoth Cave National Park (MCNP) richly express Kentucky's biodiversity. Within the watershed, more than 84 species of fish and 46 species of mussels have been identified. Seven of the mussel species are federally listed as endangered and 11 others listed as "species of concern" by the Nature Conservancy and the Kentucky State Nature Preserves Commission. Additionally, the wide variety of rare and endangered cave-dwelling species in MCNP include invertebrates and two species of insectivorous bats.

This region and its native wildlife are impacted daily by a variety of pollutants. "Within the karst basins of South-central Kentucky are agricultural, urban, transportation and industrial land-uses that contribute recharge to the aquifer," reports Dr. Cathleen Webb of Western Kentucky

University (WKU). With multiple new power plant applications pending in the Commonwealth, increasing demands for power in the region will contribute additional mercury, NO_x and SO_x in the future. In light of these developments, Dr. Webb asserts "[a]n understanding of the current levels of mercury is critical, particularly in a karst aquifer system where transport of contaminants can be rapid."

A persistent, bioaccumulative toxin, mercury is known to have significant impacts on aquatic species, other native wildlife, and humans alike. "In adults," says Dr. Webb, "mercury exposure has been shown to cause impairment of sensory and motor functions and damage to the cardiovascular system. The health effects...are compounded by mercury's ability to bioaccumulate in the food chain." Given that karst springs are a source of drinking water for several municipalities within the watershed and that the terrain is particularly vulnerable to contamination by human activities, Dr. Webb's work will establish a baseline of the region's mercury content. "With future significant increases in atmospheric deposition of mercury to the Park and surrounding area, it's imperative to determine the current extent and distribution of mercury at the Park."

Dr. Webb's current research is the second of three stages of a larger mercury-related work that she initially undertook in 2001-02. Phase I, "The Distribution of Mercury in Mammoth Cave National Park," was funded by the USGS 104B program of KWRRI, while the related "Evaluation of Mercury Bioaccumulation in the Green River Ecosystem," was funded by the National Park Service under a joint program with USGS. Dr. Webb's present grant bridges a gap between

the earlier and latter stages of funding. The overall objectives of Phases I and II, for both field and laboratory components, are:

- 1) to establish the extent, occurrence, and distribution of mercury in groundwater, surface water and sediments in MCNP;
- 2) to determine the levels of mercury...in fish and mussels in MCNP in order to compare [them] to the health, diversity, population, and reproductive status of the species; and
- 3) to investigate the fate and transport characteristics of mercury in a karst aquifer system.

The Mammoth Cave project will assist in determining the levels of mercury contamination from existing sources with an eye toward potential contamination from future sources. Water samples, along with fish muscle and liver tissue and Asiatic clam samples, already have been taken and "indicate at least moderate levels of mercury are present in Mammoth Cave national park," states Dr. Webb.

"Understanding caves and karst hydrology is critically important because ten percent of the Earth's surface is occupied by karst landscape and as much as a quarter of the world's population depends upon water supplied from karst areas," asserts Dr. Webb. "The proximity of WKU to the Mammoth Cave/Upper Green River watershed makes this site an ideal outdoor research laboratory. The diverse nature, importance, complexity, and widespread applicability of the environmental issues in this watershed naturally require the use of interdisciplinary approaches."

Reminder:
**KWRI Annual
Symposium**

February 19

The Kentucky Water Resources Research Institute's Annual Symposium encourages information transfer by providing opportunities for individuals conducting water-related work (e.g., research, management, education) to discuss their findings, preliminary or final, with others interested in the waters of the Commonwealth. The 2004 Symposium will take place on February 19th at the Holiday Inn North.

KWRI invites abstract submissions of recent or ongoing water research or other related environmental activities through **the abstract submission deadline of January 7, 2004**. Proposals for theme sessions also are under consideration. Volunteers for organizing/moderating such sessions should indicate their interest(s). In addition, a limited amount of space is available for poster presentations and exhibits.

For complete details of abstract, theme, poster, or exhibit submission or to obtain more information regarding the symposium, please contact:

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**National Institutes for Water Resources
U.S. Geological Survey**

**Water Resources Research National Competitive Grants Program:
Request for Proposals**

The U.S. Geological Survey in cooperation with the National Institutes for Water Resources requests proposals for matching grants to support research on the topics of water supply and water availability, which are issues of importance nationwide. Proposals are sought in not only the physical dimensions of supply and demand, but also quality trends in raw water supplies, the role of economics in water supply and demand, and institutional arrangements for tracking and reporting water supply and availability.

For planning purposes, the amount available for research under this program is estimated to be \$1,000,000 in federal funds, though there has not been a FY 2004 appropriation of funds for this program as of the date of this Announcement. Any investigator at an institution of higher learning in the United States is eligible to apply for a grant through a Water Research Institute or Center established under the provisions of the Water Resources Research Act of 1984, as amended.



Proposals involving substantial collaboration between the USGS and university scientists are encouraged. Proposals may be for projects 1 to 3 years in duration and may request up to \$250,000 in federal funds.

Successful applicants must match each dollar of the federal grant with one dollar from non-federal sources. Proposals must be filed on the Internet at <https://niwr.org/NIWR/> by 5:00 PM, Eastern Standard Time, March 1, 2004 and must be approved for submission to the National Competitive Grants Program not later than 5:00 PM, Eastern Standard Time, March 12, 2004 by the Institute or Center through which they were submitted. The Government's obligation under this program is contingent upon the availability of appropriated funds.

Proposals under this Announcement will be accepted only through the Internet site at <https://niwr.org/NIWR/>. Prospective applicants (Principal Investigators) must register at that site prior to submitting a proposal. Registration and proposal acceptance began on the Internet site on December 1st. Detailed instructions for proposal preparation and submission are available online at this time.

ACCESS TO COMPLETE RFP

https://niwr.org/2004_104G_RFP

America's Crumbling Infrastructure

\$36.2 Billion Needed to Fix Nation's Dams

\$10.1 Billion for 'Most Critical' Structures

According to the American Society of Civil Engineers (ASCE), our nation's infrastructure is falling apart, and nowhere is this deterioration more apparent than in our nation's dams. ASCE's *2003 Progress Report for America's Infrastructure*, released in September, judged dams as being in worse condition than reported two years ago, when they merited a grade of 'D' on the *2001 Report Card for America's Infrastructure*. This continued deterioration is valid cause for concern, if not alarm.



In response, the Association of State Dam Safety Officials (ASDSO) has compiled state and national estimates of the cost of dam rehabilitation. A nine-member task committee of ASDSO has concluded that the cost of upgrading or repairing all of our nation's non-federal dams would exceed **\$36 billion**. The cost of needed work for Kentucky's Category One through Four Dams comes in at more than \$358.7 million.

The committee's intensive two-year, peer-reviewed study considered the number of state-regulated dams, the size of the dams, the costs of deferred maintenance (any maintenance activity that does not require formal engineered plans or the approval of a professional engineer), the cost of engineering evaluation and design, the cost of rehabilitation (whether repair, replacement or removal) and the cost of increasing storage capacity or structural upgrades. Estimates do not include costs for administration of a funding mechanism; nor do they take into account the increasing number of high-hazard-potential dams.

The committee's report, *The Cost of Rehabilitating Our Nation's Dams: A*

Methodology, Estimate and Proposed Funding Mechanisms, states that almost one-third of \$36 billion national cost — \$10.1 billion — is needed for the nation's most critical dams, those whose failure would cause loss of human life. The states currently regulate more than 10,000 of these "high-hazard-potential" structures, and this number is increasing.

In the past two years, at least 21 dam failures have occurred in the U.S. Working to prevent such calamities, ASDSO has been instrumental in the passage of dam safety legislation, as well as the establishment and strengthening of state dam safety programs. However, financial constraints on dam owners limit the effectiveness of such programs.

More than 50 percent of U.S. dams are privately owned. Most dam owners are not wealthy, and even those who possess considerable financial resources are often overwhelmed with the staggering costs of dam maintenance, repairs and upgrades.

"Maintain 'em or drain 'em," a motto adopted by the National Park Service Dam Safety Program, expresses the dam owner's dilemma. Faced with the choice of repairing or upgrading a dam, or the less expensive option of draining a lake, many owners choose the latter course; however, where dams provide drinking water or flood control, dam removal may not be a viable alternative.

The loss of a reservoir of any size often has negative economic and social impacts on local communities' water supplies, recreation and flood control, particularly with increasing development in historic floodplain areas currently protected by dams. Dam removal in these areas leaves downstream properties highly vulnerable to flooding.

After developing a reliable estimate of the national cost of dam rehabilitation, ASDSO's task committee recommended

the creation of a national dam rehabilitation loan program and worked with lawmakers to draft legislation to fund repairs for high-hazard-potential dams. The Association currently is seeking a sponsor for the legislation.

Because many states cannot afford to wait for a national funding program, the ASDSO report provides guidelines for establishing state revolving loan funds for dam rehabilitation, repair and removal. Any future federal loan programs could then supplement these state funding mechanisms. Funding programs for dam repairs now exist in fewer than a dozen states, but ASDSO is working to improve this situation.

Raul Silva, co-chair of the task committee, hopes that federal lawmakers will act. "When public safety is an issue, the federal government often takes a proactive approach to repairing other elements of the national infrastructure," emphasized Silva. "Unfortunately, dams have not gotten this kind of comprehensive attention, maybe because they're usually built in out-of-the-way locations and they're not something that people actually see and use directly in their daily lives. But the benefits that dams provide are tangible and the risks posed by dams that are not properly maintained and repaired are real."

"For a long time, we in the profession have said that inspections alone are not enough to make dams safe; that dam owners facing expensive maintenance and repairs need financial help. Now, for the first time, we have a realistic answer to the question, how much will it take to fix the problem?" said Silva.

The Association of State Dam Safety Officials is a national, non-profit organization dedicated to improving dam safety through research, education, and communication. Visit their website at www.damsafety.org

Kentucky Natural Resources & Environmental Protection Cabinet

Environmental & Natural Resources Scholarships

Environmental and Natural Resources Scholarships are available to college juniors, seniors and graduate students. The Natural Resources and Environmental Protection Cabinet (NREPC) sponsors this scholarship program through the Kentucky Water Resources Research Institute (KWRRRI). Scholarships will be awarded to students in academic disciplines that are of critical need to the Cabinet. The number of scholarships awarded depends on the availability of funds.

Scholarships cover the cost of in-state tuition, room and board, books, and fees. The amount of support is determined by the Financial Aid office at the respective university. Students who accept the scholarship are obligated for employment with the NREPC following graduation.

Applicants must be or become full-time students who, by their initial funded semester, will have completed a minimum of 60 semester hours, or met the entrance requirements for graduate school. Applicants must be enrolled in a public university in Kentucky.

Scholarship recipients will be selected on a competitive basis. Selection criteria include: GPA, written essay, letters of recommendation by faculty advisor, and evidence of leadership. Upon receiving the recommendations of the KWRRRI, the NREPC will invite selected candidates for a personal interview. After the interviews, the NREPC will extend a scholarship contract to those students whom the Cabinet thinks have the greatest promise as future employees.

For the student to be awarded a scholarship, he/she must agree, by contract, to work full time for the NREPC immediately after graduation. The term of the employment obligation is six months of employment for each semester of financial aid.

The NREPC will provide summer employment for scholarship students if they are not in school. Alternative work or study plans for the summer are to be presented by the scholarship student to the Cabinet.

Students awarded a scholarship must maintain a full-time student status, make normal progress toward the degree indicated, and maintain a satisfactory GPA leading to graduation. The scholarship is awarded each semester based on the above and the availability of funds from the Cabinet. If the student fails to meet the above criteria, he/she may be dropped from the program but may re-apply when such deficiencies are corrected.

Scholarship awards will be distributed by the Financial Aid office at the state university. Out-of-state students will be supported at the in-state level.

If the student fails to meet the terms of the scholarship contract, repayment will be made to the KWRRRI at an interest rate of 12% per annum. In case of default, student records will be held until satisfactory repayment arrangements are made.

For additional information, contact:

KWRRRI

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The completed application for the Natural Resources Environmental Protection Scholarship is to be sent to KWRRRI on or before February 15.

The Natural Resources and Environmental Protection Cabinet does not discriminate on the basis of race, color, national origin, sex, age, religion, or disability. The NREPC provides, upon request, reasonable accommodations including auxiliary aids and services necessary to afford an individual with a disability an equal opportunity to participate in all services, programs, and activities.

NWRI Fellowship

The National Water Research Institute (NWRI) of Fountain Valley, CA, is a non-profit organization dedicated to promoting and funding research in the fields of water science and technology. NWRI offers fellowships up to \$15,000 to graduate students conducting research related to water resources. For full application information, please contact Anna.Hoover@uky.edu.

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Previous issues of *Waterworks* can be viewed on the KWRRRI web site at <http://www.uky.edu/WaterResources/>



From Interim Director Jim Kipp

December always seems to be busy at the Kentucky Water Resources Research Institute, and this year is no exception. Part of the frenzy is obviously related to the combined end-of-semester and holiday rush, but several of our programs and activities have timetables that seem to contribute to the time crunch.

Preparations are well underway for the Annual Water Resources Symposium. **The deadline for submission of abstracts is January 7, 2004.** The schedule for the February 19th program will be developed and distributed as soon as all of the abstracts are in. Watch your mail in late January for the program announcement and registration form.

The Kentucky Natural Resources and Environmental Protection Cabinet provides scholarships for college students studying in critical discipline areas. Since the 1991-92 academic year, over 40 students have been supported in areas including Engineering, Geology, Chemistry, Biology, and Toxicology. The application deadline is February 15 of each year. Additional information about the Environmental Protection Scholarship Program is included on page 5 of this newsletter.

Waterworks seeks to highlight water-related research conducted by investigators supported through the Institute. This issue is no exception and page 2 describes a current project

related to the occurrence and distribution of mercury in the vicinity of Mammoth Cave National Park conducted by Cathleen Webb at Western Kentucky University.

Please contact the Institute any time that we might be able to help support or publicize your research, education, and outreach efforts related to water resources. Our quarterly newsletter can include relevant announcements and information submitted to meet the March, June, September, and December publication schedule.

--Jim Kipp