

# Virginia Water Resources Research Center

## Annual Technical Report

### FY 1999

## Introduction

During the FY 1999 reporting period the Virginia Water Resources Research Center (Water Center) used the Section 104 program to support the publishing of its newsletter (Water Central), to develop and update its website each day, and to support internal operations. In summary, the 104 funds were dedicated to the outreach function. Supplemental funds added to the base grant by other federal agencies were used to conduct studies of the wetlands permitting program of the Army Corps of Engineers. The Center also was able to support USGS student interns. Research project funding, additions to the outreach program, and educational programs were supported from university (Virginia Tech) funds, direct state appropriations, and extramural grants.

## Research Program

The research constituted of six projects dealing with modernization of the US Army Corps of Engineers policies and programs.

### Basic Project Information

<b>Basic Project Information</b>	
<b>Category</b>	<b>Data</b>
<b>Title</b>	Modernizing US Army Corps of Engineers Policies and Programs
<b>Project Number</b>	COE-01
<b>Start Date</b>	03/01/1999
<b>End Date</b>	02/28/2001
<b>Research Category</b>	Social Sciences
<b>Focus Category #1</b>	Economics
<b>Focus Category #2</b>	Law, Institutions, and Policy
<b>Focus Category #3</b>	Water Quantity
<b>Lead Institution</b>	Virginia Water Resources Research Center

### Principal Investigators

<b>Principal Investigators</b>			
<b>Name</b>	<b>Title During Project Period</b>	<b>Affiliated Organization</b>	<b>Order</b>
Leonard Shabman	Professor	Department of Agricultural and Applied Economics	01

### **Problem and Research Objectives**

Six projects were initiated during the year. 1) The US Army Corps of Engineers has a multiplicity of policies governing their Flood Control and Navigation authorities. A systematic listing of these polices was prepared and then compared, noting consistencies and inconsistencies by William Holiday. Possibilities for consolidation were identified. A report was submitted to Dr. Eugene Stakhiv of the Policy Division of the Institute for Water Resources. 2) A research design for examining the operation of wetlands credit markets in Florida was developed. The Jacksonville District of the Corps was collecting data for implementation of the study. The data remain to be delivered. 3) An economic analysis of proposed reforms to the nationwide permitting program under Section 404 of the Clean Water Act was initiated. The reforms had been proposed and the Congress requested such a study. Data on permitting and costs were being collected. A final report will be completed in the next fiscal year. Mr. Paul Scodari, assisted by Dr. Jeffery Mullen had the principal responsibility for the study progress. Leonard Shabman provided reviews of the study design and execution. 4) Under the advisory oversight of Leonard Shabman. Mr. Paul; Scodari completed a white paper on benefit analysis for navigation system expansion under different assumptions about rail/pipeline transportation competition for bulk commodities. The report was provided to Dr. Eugene Stakhiv and was presented at a Corps intra-agency workshop. 5) Under the Government Performance and Review Act (GPRA) each agency is required to develop indicators of performance for measuring the effectiveness of their programs. A preliminary system of possible performance measures for describing environmental outcomes from Corps of Engineers activities was developed and is in review at the Institute for Water Resources. 6) A study examining the use, problems and opportunities associated with so-called in-lieu fee programs under Section 404 of the Clean Water Act was initiated under the direction of Leonard Shabman. A report will be completed in the next fiscal year.

### **Methodology**

### **Principal Findings and Significance**

### **Descriptors**

### **Articles in Refereed Scientific Journals**

### **Book Chapters**

### **Dissertations**

### **Water Resources Research Institute Reports**

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## Other Publications

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# Information Transfer Program

During the FY 1999 reporting period the Virginia Water Resources Research Center (Water Center) used the Section 104 program to support the publishing of its newsletter (Water Central), to develop and update its website each day. These activities are described below.

### Basic Project Information

Basic Project Information	
Category	Data
<b>Title</b>	Web-Based Daily News
<b>Description</b>	Since 1998, the VWRRC displays on its website state-wide and regional water related news on a daily basis. Every day the information is extracted and posted on the VWRRC website ( <a href="http://www.vwrcc.vt.edu">http://www.vwrcc.vt.edu</a> ). The web-based daily news is very popular with state and local agency personnel and interested citizens.
<b>Start Date</b>	03/01/1999
<b>End Date</b>	02/28/2000
<b>Type</b>	Library And Database Services
<b>Lead Institution</b>	Virginia Water Resources Research Center

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## Basic Project Information

Basic Project Information	
Category	Data
<b>Title</b>	Water Center - Website
<b>Description</b>	During this reporting period, the Water Center Website was expanded. Two major features of the Website include a Daily Water News which inform water experts and others about important regional water issues on a daily basis and the Website for the small water systems operators and public service authorities. Also, the Water Center website the home of the Virginia Water Monitoring Council activities, has an updated list of the Water Center's publications (some are available as pdf file), and provided linkages to federal and state agencies, research institutions, and professional societies.
<b>Start Date</b>	03/01/1999
<b>End Date</b>	02/28/2000
<b>Type</b>	Library And Database Services
<b>Lead Institution</b>	Virginia Water Resources Research Center

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## Basic Project Information

<b>Basic Project Information</b>	
<b>Category</b>	<b>Data</b>
<b>Title</b>	Virginia Water Monitoring Council
<b>Description</b>	In 1999, the VWRRC staff coordinated discussions with personnel from the Virginia Department of Environmental Quality (DEQ) and the U.S. Geological Survey (USGS) Regional Office about the concept and realization of organizing the Virginia Water Monitoring Council (VWMC) to coordinate all governmental and non-governmental water monitoring activities in Virginia. The VWRRC staff provided leadership and co-hosted several organizational meetings with the DEQ and USGS in Charlottesville and Richmond. A diverse group representing several entities and interested in water monitoring were invited and attended organizational meetings. The meeting participants concluded that a water monitoring council in Virginia is an idea worthy of further development. As a result, the Virginia Water Monitoring Council (VWMC), representing many diverse interests in water monitoring in Virginia was formed, the VWMC charter was developed, and a VWMC Steering Committee was established. The first annual meeting of the VWMC is planned for November 7, 2000 in the Hotel Roanoke and Conference Center in conjunction with the Virginia Water Research Symposium sponsored by the Water Center.
<b>Start Date</b>	03/01/1999
<b>End Date</b>	02/28/2000
<b>Type</b>	Conferences
<b>Lead Institution</b>	Virginia Water Resources Research Center

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## Basic Project Information

Basic Project Information	
Category	Data
<b>Title</b>	Innovative Wastewater Treatment Technologies for Small Communities
<b>Description</b>	The Water Center sponsored a workshop on wastewater treatment technologies for small communities on September 9, 1999 at Virginia Tech. Several experts from Virginia and other states made presentations and participated in discussion. More than 50 individuals attended the workshop.
<b>Start Date</b>	03/01/1999
<b>End Date</b>	02/28/2000
<b>Type</b>	Conferences
<b>Lead Institution</b>	Virginia Water Resources Research Center

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## Basic Project Information

Basic Project Information	
Category	Data
<b>Title</b>	Virginia Water Research Symposium'99
<b>Description</b>	The Virginia Water Research Symposium'99 was held November 15-16, 1999 in Richmond, Virginia. During the symposium, the presentations and panel discussions focused on water issues relevant to the Commonwealth of Virginia. The symposium was attended by 200 people covering a broad spectrum of interests including policy makers, researchers, environmentalists, scientists, and involved citizens.. A symposium

	proceedings was published and is available from the Water Center.
<b>Start Date</b>	03/01/1999
<b>End Date</b>	02/28/2000
<b>Type</b>	Conferences
<b>Lead Institution</b>	Virginia Water Resources Research Center

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**Basic Project Information**

<b>Basic Project Information</b>	
<b>Category</b>	<b>Data</b>
<b>Title</b>	Water Central - Bimonthly Newsletter
<b>Description</b>	In 1998, the Water Center launched a new bimonthly newsletter "Water Central" to replace the Water News that was published for 25 years but was discontinued in 1994 due to the budget cuts. The first issue of the Water Central was published in June 1998. During the reporting period (3/1/99 to 2/28/2000) seven issues (Feb 99, April 99, June 99, Aug 99, Oct 99, Dec 99, Feb 2000) of the 16-page newsletter were printed bringing the total to 12 issues. The hard copy is distributed to 2500 subscribers free of charge and 221 individuals receive electronic copies. A web-based version of the newsletter was initiated on August 1999 and at present all issues are posted on the Water Center's website ( <a href="http://www.vwrrc.vt.edu">http://www.vwrrc.vt.edu</a> ).
<b>Start Date</b>	06/30/1999
<b>End Date</b>	02/28/2000
<b>Type</b>	Newsletter
<b>Lead</b>	

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**USGS Internship Program**

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## Student Support

Student Support					
Category	Section 104 Base Grant	Section 104 RCGP Award	NIWR-USGS Internship	Supplemental Awards	Total
Undergraduate	0	0	3	13	16
Masters	0	6	0	6	12
Ph.D.	0	3	0	1	4
Post-Doc.	0	0	0	N/A	0
<b>Total</b>	0	9	0	20	32

## Awards & Achievements

Tamim Younos Associate Director of the Water Center was elected to the Universities Council on Water Resources (UCOWR) Board of Directors during the 1999 UCOWR Annual Meeting.

## Publications from Prior Projects

### Articles in Refereed Scientific Journals

Hagedorn, C., S. L. Robinson, J.R. Filtz, S.M. Grubbs, T.A. Angier and R.B. Reneau. 1999. Determining Sources of Fecal Pollution in a Rural Virginia Watershed with Antibiotic Resistance Patterns in Fecal Streptococci. *Applied and Environmental Microbiology*, p. 5522-5531. Shukla, S., S. Mostaghimi, B. Petrauskas, and M. Al-Smadi. 2000. A Multivariate Technique for Baseflow Separation Using Water Quality/Quantity Data. *Jour. Hydrologic Engineering (ASCE)*. 5(2):172-179. Stephenson, K., L. Shabman, and L. L. Geyer. 1999. Watershed-Based Effluent Allowance Trading: Identifying the Statutory and Regulatory Barriers to Implementation. *The Environmental Lawyer*, 3:775-815. Fina, M. and L. Shabman. 1999. Some Unconventional Thoughts on Sprawl. *William and Mary Environmental Law Review*, 23(3):739-775. Shabman, L. and K. Stephenson. 2000. Environmental Valuation and its Economic Critics. *Jour. of Water Resources Planning and Management (in press)*. Seaton, W.J. and T.J. Burbey. 2000. Aquifer Characterization in the Blue Ridge Physiographic Province Using Resistivity Profiling and Borehole Geophysics. *Jour. of Environ. and Eng. (in press)*. Shabman, L., L. Zepp, D.

King, and L. Wainger. 2000. Opportunities and Barriers to Private Landowners Participation in the Sale of Carbon Sequestration Credits Produced by Reforesting Frequently Flooded Agricultural Land: A Case Study in the Mississippi Delta. *American Journal of Alternative Agriculture* (in press). Burbey, T.J., T. Younos, E. T. Anderson. 2000. Hydrologic Analysis of Discharge Sustainability from an Abandoned Underground Coal Mine. *Jour. American Water Resources Assoc.* Vol. 36 (5)1161-1172. Raflo, A. 2000. Virginia STEP: Evidence that Service-Learning can Enhance a College Biology Program. In *Life, Learning, and Community: Concepts and Models for Service-Learning in Biology* (David C. Brubaker and Joel H. Ostroff, editors). American Association for Higher Education, Washington, D.C. pp. 53-60. Sherali, H.D., S. Subramanian, and G.V. Loganathan. 2000. Effective Relaxations and Partitioning Schemes for Solving Water Distribution Network Design Problems to Global Optimality. *Jour. of Global Optimization* (in press). Younos, T., F. W. Kaurish, T. Brown, R. DeLeon. 2000. Determining the Source of Stream Contamination in a Karst-Water System, Southwest Virginia, USA. *Jour. American Water Resources Assoc.* (in press).

## **Book Chapters**

## **Dissertations**

Cameron Speir. 2000. Two Costs Analyses in Resource Economics: Public Water and Sewer Costs of Alternative Land Settlement Patterns and Nitrogen Allowance Trading in Long Island Sound." M.S. Thesis Department of Agricultural and Applied Economics, Virginia Tech. S. Park. 2000. An Optimal Pipe Replacement Scheduling Model for Water Distribution Systems. Ph.D. Dissertation. Department of Civil and Environmental Engineering, Virginia Tech. Eric T. Anderson. 1999. Determining the Sustainability of Coal Mine Cavity Discharge as a Drinking Water Source. M.S. thesis in Civil and Environmental Engineering, Virginia Tech. Shivaram Subramanian. 1999. Optimization Models and Analysis of Routing, Location, Distribution and Design Problems. Ph.D. Dissertation, Department of Industrial and Systems Engineering, Virginia Tech.

## **Water Resources Research Institute Reports**

Shabman L. A. (Chair), T. Younos et al. 2000. Fiscal Years 1999-2000 Report of the Water Quality Academic Advisory Committee. VWRRC Special Report SR-18-2000. 68 pp. Younos, T., B. A. Wright, D. W. Reaves. 1999. The Potential for Developing Mine Cavity Water for Water Supplies: Institutional and Water Quality Issues. VWRRC Special Report SR12-1999. Poff, J. A. and L. Shabman (editors). 2000. Proceedings of the 1999 Virginia Water Research Symposium: Integrating Science into the Development and Implementation of the Effective Water Resource Policies. VWRRC P5-2000, 156pp. Poff, J. A. and B. B. Ross. 2000. A Confidence Report for Virginia's Groundwater. Report for the Southeast Rural Community Assistance Project, Inc., 68 pp. Grady, B.M., W. Farley, T. Younos. 1999. Telemetry Options for Small Water Systems. VWRRC Special Report SR14-1999. Garcia, K. T. Younos, C. Thompson. 1999. Restructuring Strategies for Small Water Systems: Virginia Small Water Systems Co-Operative. VWRRC Special Report SR15-1999. Keuhl, D., J. Randolph, T. Younos. 1999. The Virginia Small Water Systems Survey: An Assessment of Public Health Performance Appraisals. VWRRC Special Report SR16-1999. Murphy, E.A., K. Stephenson. 1999. Inland Recreational Fishing Rights in Virginia: Implications of the Virginia Supreme Court Case - Kraft v. Burr. VWRRC Special Report SR13-1999. 19 pp. Poff, J.A. 1999. A Homeowner's Guide to the Development, Maintenance, and Protection of Springs as a Drinking Water Sources. Virginia Water Resources Research Center, Virginia Tech, TTR-5, p. 74.

## **Conference Proceedings**

Burbey, T.J. and W.J. Seaton. 2000. Evidence for a New Hydrologic Model for the Blue Ridge and Piedmont Provinces: Proceedings of the Virginia Water Research Symposium, Richmond, Virginia (Nov. 15-16, 1999), pp. 20-24. Younos, T., M.S. Rosenzweig, J.L. Walker. 2000. Stream Health: Relating Stream Biota to Stream Water Quality. Proceedings, National Monitoring Conference, National Water Quality Monitoring Council, Austin, Texas. pp. 435-446. Younos, T., T.J. Burbey, D.W. Reaves, E. Anderson, B. Wright. 2000. The Potential of Developing Mine Cavity Water for Water Supplies in the Coalfield Counties of Southwest Virginia. Proceedings, 1999 Virginia Water Research Symposium. Virginia Water Resources Research Center, Virginia Tech, Blacksburg, Virginia. pp. 54-58. Keuhl, D.A., J. Randolph, T. Younos. 2000. Measurement of Potential Benefits of Public Health Performance Appraisals and Water System Planning. Proceedings, International Symposium, Small Drinking Water and Wastewater Systems. NSF International, Ann Arbor, MI. pp. 394-403. Keuhl, D.A., J. Randolph, T. Younos. 2000. Assessing the Relationship of Small Water System Knowledge, Management, and Operation Practices with Violations of the Safe Drinking Water Act. Proceedings, International Symposium, Small Drinking Water and Wastewater Systems. NSF International, Ann Arbor, MI. pp. 528-532. Wetzel, G., B. Grady, C.H. Byrd, T. Younos, L.W. Carstensen, D. Reaves, L. Matheson. 2000. An Integrated GIS/MIS-based Cost Model for Evaluating Effectiveness of Remote Control (Telemetric) Monitoring to Reduce Risk in Rural Small Water Systems. . Proceedings, International Symposium, Small Drinking Water and Wastewater Systems. NSF International, Ann Arbor, MI. pp. 484-492. Walker, J., T. Younos. 2000. Virginia Interactive Technology Assistance Network for Small Water Systems. Proceedings, International Symposium, Small Drinking Water and Wastewater Systems. NSF International, Ann Arbor, MI. pp. 539-545. Shukla, S., T. Younos, S. Shukla, S. Mostaghimi. 1999. Evaluation of Precipitation Quality Trends in Virginia. Proceedings of Specialty Conference on Potential Consequences of Climate Variability and Change to Water Resources of the United States. American Water Resources Association. pp. 209-212. Younos, T., T.J. Burbey, D.W. Reaves, E.T. Anderson, B.A. Wright. 1999. Alternative Small-Scale Water Supplies for Coalfield Communities: Mine Cavity Water for Drinking Water Supplies. Powell River Project Research and Education Program Report, Virginia Tech, pp. 75-79.

## **Other Publications**