Abstract #54

Developing a Coordinated Regional Coastal Monitoring Program – The Atlantic Northeast Coastal Monitoring Summit

Carlton D. Hunt[1], Barry Burgan[2], David Keeley[3], Jan Smith[4], Christian Krahforst[5], and Lynn McLeod[1]

[1]Battelle, 397 Washington Street, Duxbury, MA 02324
[2]US EPA Ocean Coastal Protection Division, Washington DC
[3]Maine State Planning Office, August, ME
[4]Massachusetts Bay NEP, Boston, MA
[5]MA CZM Marine Monitoring and Research Program, Boston, MA

Biographical Sketches of Authors

Carlton Hunt is a Research Leader in Battelle's Duxbury, MA office where he applies his chemical oceanography and ecology background to coastal assessment and restoration projects. He currently provides technical support to the US Environmental Protection Agency Oceans and Coastal Protection Division and the US Army Corps of Engineers on a variety of coastal projects including workshop facilitation for the National Estuary Program. Barry Burgan is a senior marine biologist with the U.S. Environmental Protection Agency's Office of Water, Oceans, and Coastal Protection Division. Most recently he co-authored the interagency *National Coastal Condition Report* and the *Coastal Research and Monitoring Strategy*. Prior to that, he managed the national 305(b) program and revitalized the state reporting and monitoring of water quality.

Mr. Keeley has worked for over 25 years in environmental management, policy development, and planning with an emphasis on coastal and estuarine issues. He directed Maine's Coastal Management Program for eight years and was instrumental in forming the international Gulf of Maine Program, a state-provincial environment and economy initiative. He received EPA's Environmental Merit Award in 2002 and NOAA's Coastal Steward of the Year Award in 2003 for his accomplishments and dedication to ocean and coastal management.

Mr. Smith is the Director of the Massachusetts Bays National Estuary Program and has worked on coastal policy development in Massachusetts as well as technical efforts for coastal wetland habitat assessments, invasive species, and coastal monitoring. He has worked with the Massachusetts Coastal Zone Management on the development of the state's Stormwater Policy and planning for coastal wastewater discharges.

Mr. Krahforst is the Marine Monitoring Scientist for the Massachusetts Bays National Estuary Program where he coordinates and directs the state's participation in EPA's Coastal Assessment efforts for the state of Massachusetts. He also coordinates the Massachusetts contribution to the Mussel Watch Program, a long term monitoring effort sponsored by the Gulf of Maine Council to track contaminant loadings.

Ms. McLeod is a Project/Program Manager at Battelle's Duxbury, MA office where she supports the USEPA and US Army Corp of engineers. She conducts workshops for the National Estuary Program in support of monitoring program development and manages projects developing Environmental Impact Statements.

Abstract

In 2002 a workshop was held to develop a framework for a coordinated regional ocean monitoring network for US states and Canadian provinces bordering the northwest Atlantic Ocean. The workshop brought together environmental managers, scientists, and NGO's to develop a strategy for an ecologically driven regional program and to identify monitoring and research gaps to support the region's pressing management needs. Discussions focused on nutrient over-enrichment, habitat loss, restoration, and toxic contaminants to address how the monitoring network might be organized; define challenges and benefits of a coordinated regional monitoring network; and how these efforts could be effective in resolving regional environmental issues. The workshop addressed information on ongoing monitoring, regional concerns, and questions that should be answered by a coordinated effort. The conveners developed a follow-up plan to further develop the program, obtain seed money,

and establish critical involvement from key groups. One of the actions was to hold a workshop to determine appropriate indicators for a regional *State of the Environment Report*. The indicators workshop, held in January 2004, reviewed previous indictor efforts, developed lessons learned compendium, identified key issues (fisheries, eutrophication, contaminants, land use, aquatic habitat, and climate change) requiring indicators, and developed key questions and indicators necessary to convey the status of the environment in this region. The process followed for these workshops provides a model for developing regional information to support environmental policy managers and the growing consensus on the need for integration of coastal information at the national scale.

North Carolina's Discharge Monitoring Coalition Program – NPDES Coalition based instream monitoring: old requirements, new cooperation, better water quality assessment

Lauren Elmore

NC Division of Water Quality, 1621 Mail Service Center, Raleigh, NC 27699

Biographical Sketch of Author

Lauren Elmore has worked with the North Carolina Division of Water Quality as their discharge monitoring coalition coordinator for the past 2 years. Previously Lauren has worked for a wide range of organizations including the State of Oregon, a local government, a wastewater/stormwater utility, and Radian Corporation an environmental consulting firm. Her experience has covered a wide range of issues including water supply, wastewater, non-point source pollution reduction, industrial pollution prevention, developing chemical and biological water quality monitoring efforts, TMDL development and implementation, stormwater monitoring, BMP evaluation, and permit compliance.

Abstract

The North Carolina Division of Water Quality (DWQ) has combined NPDES monitoring requirements with watershed based monitoring to create an effective program for assessing water quality. Permit holders voluntarily develop a monitoring program with the DWQ allowing the coordination of instream monitoring activities to reduce duplication and provide assessment of larger watershed conditions. In exchange for participation in the discharge monitoring coalition, members are exempted from their NPDES permit's instream monitoring requirements. Data collection, reporting, and laboratory oversight are implemented and managed by the discharger association. All requirements are documented in a Memorandum of Agreement between the Division of Water Quality and the individual permit holders. A single coalition coordinator position within DWQ is able to facilitate the collection of water quality data at over 200 monitoring locations on a monthly basis.

The basic intent of the program is to evaluate the instream impact of member dischargers and produce quality ambient data that is readily available in electronic format. This program is used to evaluate compliance with water quality standards and document water quality changes. The monitoring program is designed to evaluate coalition interests and watershed specific issues. Participation in a discharge monitoring coalition also has the potential to save permit holders money.

Abstract #56

A collaborative watershed assessment of the urban S. Platte River in Denver, Colorado

Philip A. Russell[1] and Cathy Shugarts[2]

[1]Littleton/Englewood Wastewater Treatment Plant, 2900 S. Platte River Drive, Englewood, CO 80110
[2]South Platte Coalition for River Evaluation (SPCURE), 6450 York Street, Denver, CO 80229-7499

Biographical Sketches of Authors

Philip Russell is employed as the Environmental Analyst at the Littleton/Englewood Wastewater Treatment Plant. His responsibilities include laboratory management, interaction with regulatory agencies on matters concerning analyses, and the development and implementation of research projects including watershed studies. He is currently active in the SPCURE board and monitoring committee. He is currently mentoring a WARE fellow from Bolivia on water sampling and analyses.

Cathy Shugarts serves as the Watershed Coordinator for the South Platte Coalition for Urban River Evaluation (SPCURE). Her role includes coordination of the coalition members with outside agencies to collaboratively address water quality issues and promote scientifically sound measures for monitoring and evaluating water quality in urban waterbodies.

Abstract

The South Platte River leaves the Rocky Mountains in near pristine condition and immediately flows through a high plains desert eco-region and urban Denver, Colorado. During its journey through the urban corridor it rapidly changes character. It slows, becomes impounded and channeled, and collects natural and anthropogenic pollutants.

In 1998 the South Platte Coalition for Urban River Evaluation (SPCURE) board was formed to study the urban watershed by a group of progressive utilities, communities and industries. State regulatory entities also participated. This group was initially formed to conduct a nitrate TMDL study of the urban South Platte River. The SPCURE board created a Monitoring Committee to coordinate the research effort and develop a sampling plan. The plan involved a "design-on-the-fly" approach. The coordinated monitoring effort evolved as data needs were identified and site-specific studies were implemented.

The data produced by this effort was essential to a TMDL Model. The model resulted in a nitrate mitigation plan initiated by a major point source contributor. The SPCURE success provides an excellent example, and potential model, for other watershed groups in the arid west.

Strategies that contributed to the collaborative success of the SPCURE included:

1. Initial delegation of technical coordination to a separate committee with appropriate responsibilities and authority to make decisions.
2. An emphasis on developing cooperation and collaboration vs. standardization
3. Using resources that are available and augmentation when possible.
4. Scheduling regular meetings and sampling/analyses events.
5. Keeping members informed of progress and maintaining contact.
6. Celebrating accomplishments.

Monitoring Water Quality and Community Quality of Life to Restore an Urban Storm Watershed

Guy Hager[1], William Stack[2], Ken Belt[3], and Morgan Grove[4]

[1]Parks & People Foundation 800 Wyman Park Drive, Suite 010, Baltimore, MD 212111
[2]Baltimore City Department of Public Works, 3001 Druid Park Drive, Baltimore Md. 21215
[3]USDA Forest Service, and Room 134 TRC Bldg. 5200 Westland Blvd. Baltimore, MD 21227
[4]USDA Forest Service, 705 Spear St. S. Burlington, VT 05403

Biographical Sketches of Authors

Guy W. Hager - As Director of Great Parks, Clean Streams & Green Communities, Guy is responsible for managing several partnerships aimed at improving Baltimore's ecosystem. Guy is working with Watershed 263's many project partners to undertake plan development and implementation efforts. The Parks and People Foundation is Baltimore's leading nonprofit organization providing creative solutions for recreation, parks, and natural resources.

William Stack is a Program Administrator of the City of Baltimore's Water Quality Management Section in the Department of Public Works and has served in that capacity since 1989. He has a B.S. and M.S. Degree in Biology and is a registered Professional Engineer. The principal responsibilities of his section include the Municipal Stormwater Permit Program, Source Water Protection Program, and Flood Warning Program. His section is involved in numerous water monitoring studies involving the urban streams and source water tributaries and reservoirs. Mr. Stack participates in numerous professional organizations and is Chair of the Maryland water Monitoring Council.

Abstract

The goal of the Watershed 263 project is to prepare a model urban watershed management plan with active community participation and to strategically implement community-based restoration projects to measurably improve storm water quality and community quality of life in a 907-acre storm drain watershed in southwest Baltimore City. Home to 30,000 residents, the watershed is entirely urbanized with mixed industrial, institutional, and residential land uses, This project involves the efforts of several partners from all levels of government, academia, community-based organizations, and the private sector including the Parks & People Foundation, Baltimore City Department of Public Works, and the US Forest Service Research.

The plan process will test the feasibility and cost-effectiveness of various urban water quality restoration techniques to improve water infiltration, primarily focusing on comprehensive community greening on vacant abandoned residential and industrial sites, school grounds, and parks through community stewardship projects. This model plan will be monitored to measure outcomes and document the benefits verse the cost of various restoration techniques.

Sustained success will be dependant on the active participation of the people who live, work, and play in these racially diverse, low income, inner city neighborhoods. A fundamental element of the community-based environmental protection process is for diverse stakeholders to be involved in crafting and implementing a shared vision, goals, priorities, and strategies for sustainable environmental protection. Most importantly, the project will renew human spirits and hope in the neighborhoods within this urban watershed, while achieving environmental improvement such as nutrient and sediment reduction to the Chesapeake Bay.

Developing Communication Strategies that Work

Abby Markowitz

Tetra Tech, Inc., 10045 Red Run Boulevard, Suite 110. Owings Mills, MD 21117,
Abby.Markowitz@tetratech.com

Biographical Sketch of Author
Ms. Markowitz has worked in the arena of public education, community-based environmental protection, community organizing, training, workshop coordination and facilitation, technology transfer/ communications, and program development for over 15 years. Ms. Markowitz is an experienced speaker, writer, facilitator and trainer on a wide variety of environmental, organizational and programmatic issues such as stakeholder involvement, capacity building, community-based environmental protection, environmental stewardship, grassroots fundraising, strategic planning, community leadership development, nonpoint source pollution prevention, fostering partnerships/collaboration, and volunteer environmental monitoring. Currently she manages the Outreach and Communications group in Tetra Tech's Owings Mills (Baltimore) office.

Abstract
The ability to express an idea is as important as the idea itself. Communication to a wide audience (from elected officials to scientists to managers, and to the local citizen) is an integral part of successful environmental protection. However, just because we know it is important doesn't mean we know HOW to communicate. Developing communication strategies involves setting goals and figuring out how to reach them. When determining how to communicate monitoring results, we need to ask and answer a series of questions, which, taken together, comprise the building blocks of effective outreach:

- What are our *objectives*?
- Who are our targeted *partners and audiences*?
- What is the overall *message* we want to convey?
- What *formats* are we going to use to convey the message?
- How will we *distribute* the product?
- How will we *evaluate* the success of the strategy(s)?

This presentation will provide an overview of these basic building blocks and set the stage for the presentations to follow in this session, *Communication with Public Audiences*, and the session on *Communication Among Monitoring Entities*.

Web-Based Watershed Tools for the Classroom: A Pilot 319 Project for Grades 4-8 in Missouri Watersheds

Tabitha Madzura and Vishal Rijhwani

University of Missouri Outreach & Extension, 232 Agricultural Engineering Building, UMC, Columbia, MO 65211-5200

Biographical Sketches of Authors

Tabitha Madzura is the Director of the Missouri Watershed Information Network (MoWIN) a University of Missouri Outreach & Extension Water Quality Project. Tabitha currently locates, accesses and compiles watershed-related information into MoWIN's website, edits, writes grant proposals, plans and implements project programs, writes publications, prepares and delivers conference/workshop presentations and manages the project web site. Tabitha was awarded Association of Natural Resources Extension Professional Silver Award (2nd place) for developing a Web-based watershed management curriculum in 2003.

Vishal Rijhwani is a Graduate Student in University of Missouri Columbia, He is responsible for developing & designing interactive websites for five watersheds in Southwest & Northeast Missouri based on information provided by local watershed groups & other research projects. He updates Mowin website periodically as directed. Vishal also assist in developing the project newsletter. His interest lies around developing Interactive Web sites & web related tasks. His aim is to develop a web based learning environment using animation to enhance understanding of the student & to make learning a fun.

Abstract

Water is costly to purify and transport, impossible to substitute - and essential to food production, economic development, plant and animal life. In the United States over 250 million people depend on rivers, lakes, streams and ground water supplies for their drinking water. Approximately 179 water bodies are listed on Missouri's 1998 Final 303 (d) List for Impaired Waters and require immediate restoration to designated uses. Many streams suffer from low water volume, organic enrichment, siltation and polluted runoff. There is need to address surface runoff, groundwater, sediment, in-stream nutrients, wildlife and fish populations from the perspectives of researchers, state and federal conservationists, local citizen-based watershed groups, natural resource interest groups, landowners, farmers, young children plus local officials.

The Internet is increasingly playing a vital role by providing access to watershed information. MoWIN proposed to develop and disseminate interactive watershed information web sites for use in schools (grades 4-8) in five Missouri watersheds. Web site topics include history, agricultural activities and statistics, human impact on the environment, recreational resources, non-point source pollution and prevention, plant and animal life plus water quality information. This project is an additional tool for educators to improve science education library collections and integrate watershed education with science, social studies and other subjects and to help increase children's awareness of local community natural resources. Objectives include: providing information to encourage participation in watershed stewardship; increasing knowledge and understanding about watersheds and facilitating development of skills to identify and prevent nonpoint source pollution. For additional information please visit http://outreach.missouri.edu/mowin

Can a Portal for Water Quality Information Make a Difference?

Beverly McNaughton

Department of the Environment, 201-401 Burrard Street, Vancouver, British Columbia, Canada V6C 3S5

Biographical Sketch of Author
Beverly McNaughton is an environmental monitoring scientist in the Aquatic and Atmospheric Sciences Division of the federal Department of the Environment in the Pacific and Yukon region. She has been involved with the federal and federal-provincial water quality monitoring program and trend assessment network since 1990 working in partnership with the British Columbia Ministry of Water, Land and Air Protection. She is currently working on a regional water quality website, through support from the Canadian Information System for the Environment that provides timely access to water quality data and information.

Abstract
The Department of the Environment and the British Columbia Ministry of Water, Land and Air Protection opened a portal for obtaining regional water quality data and information. The website provides information on the federal-provincial long term water quality monitoring network, as well as primer information on both the British Columbia and Canadian Water Quality Guidelines. The site also enables users to download and graph integrated water quality and water quantity data with user selectable guidelines.

For a decade, federal-provincial water quality data have been primarily used by government for decisions on watershed and water resource planning initiatives, formulation of guidelines and objectives, impact and trend assessments, state of environment reporting, loadings, detecting emerging issues and evaluating the effectiveness of policies and programs affecting watershed uses. The launch of a water quality website marks the first occasion where the general public will have timely access to federal-provincial water quality data, reports and program information. The recent development of web services enables our regional partners and interested community groups to interact and communicate within our website for data and information on demand.

Can this approach make a difference? Definitely! Through the use of the website, we are able to reach a broader and more diverse audience, while providing them with regional data and awareness of both regional and national water quality issues and concerns.

IOWATER Snapshots Provide Picture of Water Quality Statewide

Lynette Seigley

Iowa Department of Natural Resources – Iowa Geological Survey, 109 Trowbridge Hall,
Iowa City, IA 52242-1319; lseigley@igsb.uiowa.edu

Biographical Sketch of Author
Lynette Seigley is a research geologist with Iowa's Water Monitoring Program. She received a B.A. in geology from the College of Wooster in Ohio and an M.S. in geology from the University of Iowa. She has worked for the Iowa Department of Natural Resources – Iowa Geological Survey since 1987. Currently, she helps coordinate the monitoring of Iowa's water resources in order to assess status and trends. She is also involved in IOWATER, Iowa's volunteer water monitoring program, and has facilitated snapshot samplings statewide.

Abstract
IOWATER, Iowa's volunteer water monitoring program, has been successful in coordinating 21 snapshot sampling events in various counties and watersheds across Iowa. In order to provide these "snapshots" of water quality in time, multiple sites throughout a county or watershed are sampled within a short period of time. These monitoring partnerships between volunteers and state/county/local officials have been extremely beneficial. On National Monitoring Day in October 2002, IOWATER attempted its first statewide snapshot sampling event. National Monitoring Day provided an opportunity for IOWATER monitors across Iowa to collect data from their monitoring sites using IOWATER methods and submit their data to the IOWATER online database (www.iowater.net). National Monitoring Day was the springboard for subsequent statewide snapshot events in Iowa, with a second event held May 2003 and a third held in conjunction with International Monitoring Day on October 18, 2003. Data submitted by IOWATER monitors as part of these snapshot events are summarized in a report sent to all participants and made available on the IOWATER website. Because of growing interest in the statewide snapshot samplings, IOWATER continues to sponsor events in the spring, summer, and fall of each year as an event in which IOWATER volunteers can participate. With each statewide snapshot, a steady increase in the number of participants and the number of sites sampled has been observed. The number of sites monitored has grown from 68 sites sampled in October 2002 to more than 140 sites in October 2003. Results from the statewide snapshots will be presented.

Water Quality Status and Trends in the Clark Fork-Pend Oreille Watershed

Bruce Anderson[1], John Babcock[1], and Gary Ingman[2]

[1]Land & Water Consulting, Inc., P.O. Box 8254, Missoula, MT 59807
[2]Land & Water Consulting, Inc., P.O. Box 239, Helena, MT 59624

Biographical Sketches of Authors

Bruce Anderson is a senior hydrologist/statistician and the president of Land & Water Consulting, Inc. Bruce works in the areas of stream, wetland, and riparian restoration, channel and fishway design, and surface/ groundwater modeling projects. Recent work includes arsenic modeling and sediment transport/peak flow analyses associated with a CERCLA dam removal project, FERC relicensing projects including heavy metals studies in the Missouri-Madison rivers, design and construction of stream channels and hydraulic structures for state and federal agencies, bioengineering techniques for stream bank restoration, and development of a stream project technical guidance manual and a stream permitting guide for the State of Montana.

John Babcock is a senior hydrologic technician in Land & Water's Missoula, MT office involved in water quality monitoring, groundwater remediation, stream restoration, fisheries enhancement, hydraulic modeling, and watershed analysis. Since joining Land & Water in 2001, John has operated the water quality monitoring and assessment program in the Clark Fork of the Columbia River Basin that is described in this paper. Prior to 2001, John worked for the Henry's Fork Foundation and established a long-term monitoring project on the Henry's Fork of the Snake River and its tributaries, and as a field technician for a fisheries consulting firm.

Gary Ingman is a senior biologist/watershed scientist and Land & Water's TMDL projects coordinator. Gary joined the staff of Land & Water in 2001 after more than 20 years with Montana state natural resource agencies. Gary's work at Land & Water has included watershed assessments and restoration planning, water quality monitoring network design, and providing technical assistance to citizen's groups, conservation districts, and private landowners. Gary served as a Region 8 states' representative on the National Water Quality Monitoring Council from 1997-2001.

Abstract

This study analyzed water quality status and time trend data for the Clark Fork-Pend Oreille watershed of western Montana, northern Idaho, and northeastern Washington, as influenced by Superfund mine cleanup activities and implementation of a three-state nutrient management plan. The information is derived from a cooperative interstate monitoring program which focuses on algal nutrient and heavy metal concentrations and periphyton standing crops in the Clark Fork River; nutrient loading rates, periphyton standing crops, and Secchi transparency in Pend Oreille Lake; and nutrient concentrations in the Pend Oreille River. The presentation reviews the program monitoring objectives, statistical methodology, water quality data analysis, and monitoring results in relationship to various point and non-point source pollution control measures. The results of the current data analysis are being used by the Tri-State Water Quality Council to document water quality improvements resulting from 10 years of collaborative watershed restoration efforts, and as a feedback mechanism to fine-tune management approaches in the three-state area.

Abstract #63

Evaluation of the Long-Term Impacts of Urbanization on a Piedmont Headwater Stream: A Comparison of Physical, Biological, and Chemical Indicators of Response

Robert L. Bourne[1] and Ted Mikalsen[2]

[1]Environmental Compliance Supervisor, Cobb County Water System, Central Laboratory,
622 South Cobb Drive, Marietta, GA 30060
[2]TMDL Implementation Coordinator, Georgia Environmental Protection Division,
4220 International Parkway, Suite 101, Atlanta, GA 30340

Biographical Sketches of Authors

Robert Bourne has a B.S. in Environmental Science from the University of Georgia. He has worked for Cobb County for almost 18 years. He presently holds the position of Environmental Compliance Supervisor and has also held positions as a Laboratory Analyst and Stream Monitoring Coordinator.

Ted Mikalsen is the Total Maximum Daily Load (TMDL) Implementation Coordinator for the Georgia Environmental Protection Division where he has been involved in river basin planning and management, nonpoint source pollution assessment and management, and nonpoint source grant and contract management. He received his Master of Urban and Regional Planning and engaged in further study of the effects of urban storm water on water quality at Florida State University.

Abstract

A long-term field study was initiated in 1996 to evaluate the response of a 100 m reach of a tributary of Proctor Creek, a 3.1 km^2 watershed in the Atlanta metropolitan area, to the impact of rapid urbanization in the watershed over time and in comparison to a reach of a physically comparable but almost fully developed urban watershed. The objectives of the study are to measure, evaluate, and compare long-term changes in channel cross-sections, bank and channel scouring, streambed composition, longitudinal reach profiles, plan-form dimensions, biological habitats and communities, water chemistry, and land cover to determine the timing and response of the stream to urbanization within the watershed and in comparison to the almost fully developed urban watershed. Since the onset of physical observations in 1996, when increased sedimentation deposition was the most evident indication of increased upstream development in the study reach, there has been an 18 to 25% increase in impervious cover from 1995 to 1999, a decline in macroinvertebrate taxa richness and disappearance of sensitive species since 1995, increased sinuosity, increased mean cross-sectional area, extensive bank undercutting and cantilever failure in the lower portion of the reach, scouring and undercutting of an outside bank and downstream migration of a cobble deposit in the middle section, scouring of root-armored banks in the upper portion of the reach, and extensive silt and sediment deposition over the entire reach. Since 1990, a composite index of water quality measurements has decreased; measures of conductivity, total suspended solids, and turbidity have increased, and oxidized nitrogen and dissolved oxygen saturation have decreased. The presentation will more fully describe and evaluate those changes and compare them to one another and measurements for the developed watershed.

Characterizing Hysteretic Water Quality in Southern Appalachian Streams

Mark S. Riedel, James M. Vose, and Paul V. Bolstad

USDA Forest Service, Coweeta Hydrologic Laboratory, 3160 Coweeta Lab Rd, Otto, NC 28763

Biographical Sketches of Authors

Mark S. Riedel (mriedel@fs.fed.us) is a Research Hydrologist at the USDA Forest Service, Southern Research Station, Coweeta Hydrologic Laboratory. Dr. Riedel's research interests include land use legacy influences on water quality and fluvial processes, riparian land use impacts on stream stability, and the cumulative effects of forest roads on erosion and sedimentation.

Abstract

Water quality in mountain streams of the southern Appalachians varies seasonally and with storms. In an effort to validate Total Maximum Daily Loads (TMDLs) for sediment in the Chattooga River Watershed (NE Georgia, NW South Carolina, and SW North Carolina), we studied four tributary streams over an eighteen-month period. Two of the streams had completely forested watersheds; one stream was a benchmark with exceptional water quality for the purposes of TMDL establishment while the other was impaired by excessive sedimentation. The third stream, with a completely forested watershed, was adjacent to a gravel road. This stream was threatened by excessive sedimentation. The fourth, while mostly forested, had residential development and gravel roads in its riparian corridor. This stream was also threatened by excessive sedimentation. We measured stream flow continuously and sampled Total Suspended Solids (TSS) to characterize the hydrology and water quality of these streams during baseflow and storm flow conditions. TSS data on the benchmark stream and a forested stream exhibited strong hysteresis and were elevated on the rising limbs of hydrographs and declined rapidly on the recession limbs. While there was weak hysteresis apparent in the constituent concentrations and loadings of the impaired streams, it was not statistically significant. Thus, we could not simply characterize loadings with typical constituent vs. discharge rating curves. We filtered TSS and discharge data into rising and recession limb data based upon hydrograph slope and analyzed the data separately. We constructed a series of rating curves based upon hydrograph thresholds that allow us to predict loadings as a function of hydrograph dynamics. This modified approach facilitates the establishment of TMDLs because the hydrograph threshold-rating curves can be used to directly link loading rates to discharge frequency and duration relationships.

Monitoring Leads to Successful TMDL Development

Tim A. Wool[1] and Steven R. Davie[2]

[1]US EPA Office of Research and Development, National Exposure Research Laboratory/Ecosystems Research Division, Atlanta Federal Center, 61 Forsyth Street, Atlanta, GA 30303, wool.tim@epa.gov
[2] Tetra Tech. Inc., 2110 Powers Ferry Road, Suite 202, Atlanta, GA, 30339, steven.davie@tetratech-ffx.com

Biographical Sketches of Authors

Tim Wool is the Director of the Watershed and Water Quality Modeling Technical Support Center located within the U.S. Environmental Protection Agency's Office of Research and Development, National Exposure Research Laboratory in the Ecosystems Research Division. He was previously with EPA Region 4, as a member of the TMDL modeling and technical support section where he was responsible for the development and review of numerous TMDLs.

Steven Davie is the Regional Director of water resources projects in the southeast for Tetra Tech, Inc. He has over 9 years of experience working on water resources related projects including expertise with hydrodynamic and water quality monitoring, water quality modeling, hydrodynamic modeling, TMDL development, and water resources planning. Mr. Davie has managed several data collection efforts in the Savannah Harbor Estuary GA, Masons Inlet NC, Naples Bay FL, Mill Creek GA, Calebee Creek AL, and several projects in the Everglades. As a modeler, he has worked on the numerous riverine, lake, and estuarine model applications in the southeast.

Abstract

The success of a TMDL determination is relied on the use of good science in linking pollutant sources with water quality. Many times TMDLs are developed using limited amount of data that does not provide detailed information on what are the trends and problems in the waterbody. It is paramount to collect adequate information to parameterize the current loadings, the resultant water quality to applied sophisticated mathematical models.

This paper suggests methodologies that should be used in the development of TMDLs where social and economic consequences can be high. The case study presented here is for the Neuse River Estuary, where a TMDL for total nitrogen was developed and approved by the Environmental Protection Agency (EPA). The Neuse River Basin is 179 miles long with a maximum width of 51 miles (3,640,353 acres). The Neuse River Basin has a very diverse landuse distribution that ranges from urban (Raleigh/Durham metropolitan area) to agricultural and livestock.

The State of North Carolina realized that a TMDL developed for total nitrogen could have an impact on the municipalities and business located within the basin. The State committed to the development and implementation of monitoring plan that could be used to characterize the loadings to the estuarine portion of the watershed. Furthermore, State collected other information such as: salinity, temperature, dissolved oxygen, nutrient data, water surface elevation data that could be used in the application of hydrodynamic and water quality model. It is because of this commitment to gather adequate information, informed and reasonable decisions could be made in the development of the TMDL.

A summary of the monitoring objectives, review of station locations and summary of the collected data will be given. Finally, a review of how this monitoring leads to the development of a successful hydrodynamic and water quality model.

Abstract #66

Water Quality Data Flow in the Florida TMDL Program

Ellen McCarron

Florida Department of Environmental Protection, Mail Station 3525, 2600 Blair Stone Road, Tallahassee, FL 32399-2400

Biographical Sketch of Author
Ellen McCarron is an Environmental Administrator with the Florida Department of Environmental Protection. Ellen has been with the department for twenty-two years, most of which have been involved in co-founding and managing the Florida Bioassessment Program with Russel Frydenborg. Ellen is trained in Oracle database modeling and design, and in various ESRI GIS software programs such as ArcInfo and ArcView (now ArcGIS). Ellen has been working since 1999 as the administrator in charge of watershed monitoring (i.e., Florida's statewide status and trends programs) and data management for both the referenced monitoring programs and Florida's TMDL program.

Abstract
The Florida Department of Environmental Protection is developing a comprehensive water quality data integration and management plan for its TMDL program. The overall goal of the plan is to provide an efficient data flow for TMDL program data providers that will result in much faster input, improved quality and more efficient analysis of water quality data, faster impaired waters listings and strategic monitoring planning. In short, it will solve the current problems that are associated with having a fragmented, non-integrated data system.

Some of the points to be included in the presentation are:

- How stakeholder data is used in the TMDL program
- Implementing QA data elements and use of a new software product to check the quality of laboratory analytical data from stakeholders
- Using ruggedized field PCs to automate field data collection
- Joining field data with lab data into a common repository
- Using web-based tools for water quality data checking, viewing, downloading and mapping
- Using the National Hydrography Dataset (NHD) as the basis for TMDL assessment units

A new comprehensive database is being designed and built to replace STORET as the single repository for all water quality data used in the TMDL program. Problems with STORET will be discussed.

STORET Hosting for the EPA Region VIII Tribes

Dave Wilcox[1] and Michiko Burns[2]

[1] Gold Systems, Inc, 3330 S 700 E Suite F, Salt Lake City, UT 84098
[2] Southern Ute Indian Tribe, P.O. 737, Ignacio, CO 81137

Biographical Sketches of Authors

Dave Wilcox, Vice President of Gold Systems, Inc., has served as the Practice Manager for environmental projects for over a decade. Dave oversees the development of SIM products and has completed many STORET integration and data management projects across the country for federal agencies, states, tribes, volunteer monitoring groups and private industry.

Michiko Burns received her B.Sc. in Biology from Fort Lewis College in Durango, Colorado. She has worked for five years with the National Park Service conducting research studies into noxious weed control using biological control agents. Of late, she has overseen the Water Quality Program of the Southern Ute Indian Reservation, which includes an intensive surface and groundwater monitoring program, The STORET Database Project, a wetland/riparian area study as well as the Missionary Ridge Fire Complex study.

Abstract

As the use of the new EPA STORET database is adopted around the county, difficulties have been identified by many smaller organizations as they prepare to load their data into the new system. For many of these organizations, such as tribes, volunteer monitoring groups, municipalities, and superfund sites, the overhead of setting up the required Oracle infrastructure can be cost prohibitive. This overhead includes maintaining PCs capable of running Oracle, the Oracle license fees, and access to a Database Administrator to set up and maintain STORET.

To address this problem for the EPA Region VIII tribes, Gold Systems established a program to remotely host STORET for each of the tribes. This program includes the installation of STORET on the Gold Systems' database servers, the development of WebSIM, a Web-Based import module that allows users to load data into their remotely hosted copy of STORET, and the deployment of SIM-DW, a data warehouse that provides convenient, secure access to their STORET data. Additionally, each participating tribe can load their data into a regional copy of the national STORET Warehouse, which provides additional retrieval capabilities. A secure web site was created to provide a single point of entry from which authorized users can access each of these applications, participant contact information, and project documentation, as well as news on project-related events.

In this presentation we will discuss the unique challenges we faced when working with the Region VIII Tribes regarding Data Management, Infrastructure, DBA Support, Security, Reporting and Cost. We will provide a demonstration of the WebSIM solution and, finally, discuss how it addressed each of these issues.

From Wildcat Creek to STORET: Journey of Data

Revital Katznelson[1] and David Wilcox[2]

[1] State Water Resources Control Board, Sacramento, CA; Office: San Francisco Bay Regional Water Quality Control Board, 1515 Clay Street, Suite 1400, Oakland, CA 94612, USA
[2] Gold Systems, Inc, 3330 S 700 E Suite F, Salt Lake City, UT 84098

Biographical Sketches of Authors

Revital Katznelson received her Ph.D. from the Hebrew University of Jerusalem, Israel, in 1984. She has extensive experience in performing, interpreting, and assuring quality of field and laboratory analyses of chemical, biological, toxicological, and bacteriological water quality parameters. She is currently implementing a Data Quality Management system with the Citizen Monitoring Program of the California State Water Resources Control Board.

Dave Wilcox is Vice President of Gold Systems, Inc, and serves as the Practice Manager for all environmental projects. Dave has overseen the development of the STORET Interface Module (SIM) products and has completed many STORET integration and data management projects across the country.

Abstract

A data quality management (DQM) system consisting of an array of forms, spreadsheet templates, and guidance documents, has been implemented for collection and streamlined processing of monitoring data. The DQM system provides for the primary data management functions of documentation and quality assurance in a way that allows generation and reporting of reliable, defensible, and usable data of known quality. This paper focuses on field measurements and describes the major phases of the process. Data generation and processing at the Project level include field measurements and associated documentation, error calculation, data verification and validation, and assignment of qualifiers to each measurement Result. Data then "move" to the next phase, which includes selection of information fields to export, application of a crosswalk for conversion into a format appropriate for a given central database, and export into that central database. The steps of uploading data into the new STORET (the USEPA national database) via the STORET Interface Module (SIM) demonstrate this process. Finally, data storage and retrieval options in STORET enable retrieval of Results together with information about their accuracy and their precision.

GWInfo – An Integrated Groundwater Database Entry, Retrieval, and Analysis System

Jonathan Foote and Steven Wilson

Illinois State Water Survey, 2204 Griffith Drive, Champaign, IL 61820

Biographical Sketches of Authors

Jonathan Foote is a Programmer/Analyst at the Illinois State Water Survey. His education and experience is in engineering and software design. His expertise is with client/server database software development. Mr. Foote has served as project leader on several large information systems projects. He is presently working with the Groundwater section of the Illinois State Water Survey where he has developed and is currently managing various integrated information systems.

Steve Wilson is a groundwater hydrologist in the Groundwater Section and has been at the ISWS since 1983. He has a Masters Degree in Civil Engineering from the University of Illinois. Mr. Wilson has been involved in numerous groundwater assessment projects dealing with both groundwater quantity and quality issues. He is currently involved in the collection of water quality data in the Chicago metro region that is a cooperative effort with the Illinois EPA, Illinois Department of Public Health and the six county health departments in the area. He has spent the last year completing an evaluation of the statewide arsenic occurrence in Illinois groundwater as well as working with other staff to convert the groundwater databases into a new, user-friendly system.

Abstract

The Illinois State Water Survey (ISWS) has implemented an integrated functional information system known as GWInfo. GWInfo has joined several stand-alone systems, resulting in improved data usability and availability. The ISWS maintains groundwater-related databases to provide basic information to the general public and to support applied groundwater research activities. Data include groundwater quality, public/industrial/commercial and private well properties, aquifer test, annual withdrawal, water level, and synoptic measurements. These data, which span more than 100 years, were formerly stored in separate databases, independent of each other. Each functional area had its own system for managing the data and was disconnected from other functional areas within the organization.

GWInfo crosses functional lines by joining stand-alone systems. This is accomplished by using an MSSQL database with a .Net application interface. Centrally located databases dissolve many of the barriers related to disjointed data. The current version of GWInfo allows an ISWS scientist to view, report, download, or chart data for a well or an area, for a variety of data. This powerful application allows users to create datasets in minutes that previously would have taken hours or even days to produce. In addition, because of the system architecture and the addition of spatial location information for all data, these data are being integrated into ArcSDE and ArcIMS so that public information can be shared dynamically over the web and in GIS.

Abstract #70

Designing a complex multi-objective water quality monitoring network: the New York City water supply example

David G. Smith and Richard E. Corradi

New York City Department of Environmental Protection, 465 Columbus Avenue, Valhalla, NY 10595
dsmith@dep.nyc.gov

Biographical Sketch of Author

David G. Smith is Section Chief, Information Management and Reporting, for New York City's Bureau of Water Supply. His background in the design of water quality monitoring networks began with the design of New Zealand's national network for rivers and lakes in 1989. Subsequently he successfully managed that network and produced several papers on the topic including its design, status interpretation, sampling and analytical requirements for trend detection, and trend detection itself. He used this experience to lead the redesign of the complex monitoring network for New York City's drinking water supply. He also has numerous publications in the field of human perception of natural waters and has co-authored a book on optical water quality.

Abstract

The design of a water quality monitoring network with many stakeholders and multiple objectives can be daunting. The starting point, and key to successful design, is the derivation of an appropriate set of objectives that are based on stakeholders' requirements. These objectives should be defined as precisely as possible, although this step may not be easy. Next, based on the requirements of each objective, the field sampling (including frequency) and measurement, and the laboratory analytical requirements are rigorously specified. The setting up of a database and reporting requirements also require addressing. Many of these requirements have been discussed in the literature but the starting position, the derivation of objectives, has received little attention. This paper describes this process in the way it led to the design of the New York City water supply system monitoring network. It also describes some aspects of this network, which are a consequence of, and highly dependent on, each independent objective. The Hydrology monitoring Program will be discussed as an example of the processes involved, especially the derivation of the objectives.

Hitting Moving Targets in Rivers of Change: Water Quality Monitoring for West Virginia Riverine National Parks

Jesse M. Purvis

National Park Service, New River Gorge National River, Bluestone National Scenic River, and Gauley River National Recreation Area, P.O. Box 302, Glen Jean, WV 25846

Biographical Sketch of Author

Jesse has coordinated the aquatic resources program for the three, perhaps soon to be four, river-based units of the National Park system in scenic southern West Virginia since 1997. He earned a B.S. in Fisheries from Humboldt State University, an M.A. in biology from California State University Chico, and a Ph.D. from the Aquatic Biology Program at the University of Alabama. Jesse has worked as a hydrologist or biologist for Lassen Volcanic National Park, the California Departments of Fish and Game and Water Resources, the Bureau of Land Management, and the Minerals Management Service.

Abstract

Water quality monitoring at the three river-based West Virginia units of the National Park system has evolved as we attempt to develop meaningful information that is useful to management, park neighbors, the visiting public, commercial river outfitters, and other interested agency, organizational, and individual stakeholders. Initial efforts focused on describing water quality issues in New River Gorge National River (and later Bluestone National Scenic River and Gauley River National Recreation Area as they were established). This led to a focus on monitoring fecal coliform bacteria as an indicator of sewage pollution. Inadequate sewage treatment is a widespread problem in rural areas like Appalachia, and may pose a significant health risk to park employees and visitors. Being both proactive and responsive, the program has had changes in monitoring sites and frequency, methods, and quality assurance and quality control efforts. With all of these changes, we have strived to maintain the basic focus of the monitoring program and to ensure continuity of data. To expand the basic program, special studies examined hydrologic and storm event influences on fecal coliform dynamics. Data management and presentation has evolved to respond to requests from outside agencies and user groups. Results from other water quality monitoring programs led to examination of other constituents (e.g. pathogenic organisms, polycyclic aromatic hydrocarbons). New techniques like bacteria source tracking are leading to further refinement of our knowledge of water quality in the three parks. A comprehensive technical evaluation of our water quality monitoring program is scheduled for 2005.

How Data Rich and Information Poor is Monitoring? Analyzing the Dutch National Monitoring

Jos G. Timmerman

International Water Assessment Centre (IWAC) / RIZA, P.O. Box 17, NL-8200 AA Lelystad, Netherlands

Biographical Sketch of Author
Jos Timmerman is programme manager and interim director for the International Water Assessment Centre, a collaborating center under the UNECE Water Convention, and programme manager at the Institute for Inland Water Management and Waste Water Treatment (RIZA). He is specialized in strategies for water quality monitoring and assessment with emphasis on the specification of information needs.

Abstract
Water quality management arose around 1850, by which time environmental conditions became truly intolerable as a result of industrialization. Nevertheless, regular water quality monitoring was not established before the 1950's in the USA, the former USSR and in some European countries and extended to Canada and most of Western Europe in the late 1960's and 1970's. As it appears, every now and then new problems become manifest (like in the 1990's oestrogenouos substances, tributyltins, and drugs). For management of each of the different problems, additional monitoring effort is required, leading to an ever growing monitoring need. As a result of the ever-new arising problems, the number of regulatory water quality descriptors in industrialized countries is commonly exceeding one hundred. Inevitably, this has lead to an explosive growth of monitoring networks in many countries.

The growing information needs have consequences for monitoring. In the 1950s and 1960s, information collected through monitoring was felt as essential for water management and the budgets for monitoring were rapidly growing. This eventually led to what Ward and others (1986) described as the 'data-rich but information-poor syndrome' and calls are out today for less quantity of information and more targeted, tailor-made, information.

This paper will analyze the developments in Dutch national water quality monitoring. On the basis of this analysis, we will conclude if the water quality monitoring in the Dutch situation can be characterized as wasteful, or if the amount of data that is collected reflects the policy needs.

An Evaluation and Review of State Surface Water Monitoring Programs in Region V: A Template for Evaluating State Programs

Chris O. Yoder[1] and Edward T. Rankin[2]

[1] Midwest Biodiversity Institute, P.O. Box 21561, Columbus, OH 43221-0561
[2] Center for Applied Bioassessment and Biocriteria, P.O. Box 21541, Columbus, OH 43221-0541

Abstract

We conducted an initial, but detailed assessment of the current status of monitoring and assessment programs in the EPA Region V states, with a primary emphasis on biological assessment programs. Specifically, the assessment focused on all relevant uses of monitoring and assessment including status and trends, reporting, and primary water quality management programs (WQS, planning, TMDLs, permitting). The evaluation was based on information gathered during on-site interviews with each state and published information provided by each. This process differs markedly from other contemporary efforts that are based on a questionnaire approach. The extent of program development and implementation resulting from national and regional EPA initiatives (CALM, tiered aquatic life uses, biocriteria) was also evaluated. While all of the states operate active monitoring and assessment efforts, the quality and make-up of the programs between the states varies widely in terms of design, indicators used, extent of derivation and calibration, and the extent to which water quality management programs are directly supported. The assessment of status for reporting (305b) and listing (303d) purposes is a significant, and in some cases the de facto driver of the monitoring and assessment approaches embraced by each state. The recent emphasis on TMDLs and the CALM process by EPA has amplified this issue. However, it was evident that an over-emphasis on this function of monitoring and assessment can deter the ability of States to address emerging issues such as refined uses, use attainability analyses, and improved integration with water quality management programs in general. The guiding principles of this assessment are based on the belief that monitoring and assessment programs should achieve levels of standardization, rigor, reliability, reproducibility, accuracy, comparability, and comprehensiveness that is reasonably attainable within the constraints of available technology and cost-effectiveness. Achieving these depends on the ability and willingness of states to appreciate their relevance to supporting water quality management outcomes and having access to and effectively executing the use of that technology.