GROUNDWATER/SURFACE WATER INTERACTIONS: A COMPREHENSIVE WATERSHED APPROACH

Facilitator
Mary Ambrose, Texas Commission on Environmental Quality

Presenters
Tom Winter, USGS, Denver
Marc Greenberg, USEPA
Steve Fisher, Kentucky Geological Survey
Tom Davenport, USEPA
Bob Nicholson, USGS
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Biographical Sketches
Mary Ambrose is a Senior Water Policy Analyst in the Policy and Regulations Division of the Texas Commission on Environmental Quality. She has 23 years of experience in various aspects of groundwater and surface water quality protection. She is active in both state and federal water quality issues and chairs the Texas Groundwater Protection Committee, is a board member of both the National Water Quality Monitoring Council and the Ground Water Protection Research Foundation. She works topics as diverse as groundwater nonpoint source, source water protection, Edwards Aquifer water quality protection, endangered species, and underground injection control. She received her B.S. in Geology from the University of Texas at Austin and is a licensed Texas Professional Geoscientist.

Thomas C. Winter is a Senior Research Hydrologist with the U.S. Geological Survey in Denver, Colorado. He earned BA and MS degrees in Geology and a PhD in Hydrogeology at the University of Minnesota. From 1961 to 1972 he conducted geological and water-resource studies in Minnesota, and was in charge of USGS ground-water studies there from 1968 to 1972. Since 1973 he has conducted research on the hydrology of lakes and wetlands, with emphasis on their interaction with ground water and evaporation. In the late 1970s he helped establish, and has since been a principal investigator at, four long-term field research sites; the Mirror Lake watershed in New Hampshire, the Shingobee River headwaters area in Minnesota, the Cottonwood Lake wetland complex in North Dakota, and the Island Lake area of the Crescent Lake National Wildlife Refuge in Nebraska. He also has been involved with lake and wetland studies in Washington, California, Colorado, Wisconsin, Massachusetts, and Florida. He has received the Distinguished Service Award from the U.S. Department of the Interior, the M. King Hubbert Award from the National Ground Water Association, and the W.R. Boggess Award from the American Water Resources Association, the Lifetime Achievement Award from the Society of Wetland Scientists, the O.E. Meinzer Award from the Geological Society of America, and the Outstanding Achievement Award from the University of Minnesota.

R. Stephen Fisher is a hydrogeochemist with research interests in groundwater chemistry, the chemical interactions between groundwater, soils, and bedrock, and the design of groundwater-monitoring networks. Dr. Fisher received his AB and MS degrees in Geology from Miami University, and his Ph.D. in Geology from the University of Texas at Austin. He coordinates the Kentucky Geological Survey's Groundwater Monitoring Network, and works closely with the Groundwater Branch, Kentucky Division of Water on water-quality issues. His current research is focused on a summary and evaluation of groundwater quality both statewide and within major river basins.

Thomas E. Davenport is an Environmental Scientist for the United States Environmental Protection Agency (USEPA) and was designated as the National Nonpoint Source Expert in 1994. For the 10 years prior to this designation, Mr. Davenport served as the USEPA's Region 5 coordinator for the nonpoint source and Clean Lakes programs. Present duties include being the Water Program Lead for the Great Lakes/Baltic Seas and 3 Rivers 3 Countries Watershed Capacity Building Projects. Mr. Davenport received a B.S. in Forestry and Natural

Resource Management from the University of Wisconsin-Stevens Point in 1977 and a M.S. from the University of Washington in Forest Hydrology in 1981. In 1982, Mr. Davenport received a M.P.A. from Sangamon State University (now University of Illinois-Springfield). Mr. Davenport has participated in numerous international and national Meetings, has presented at over 20 invitational watershed management workshops at international meetings. He has authored, "The Watershed Management Project Guide" and over 40 papers, book chapters and project reports. He was on the editorial board for the Center for Watershed Protection's technical journal Watershed Protection Techniques and for the Journal of Soil and Water Conservation Society. In addition, for the Soil and Water Conservation Society, he serve as an Associate Editor – Research for the Journal of Soil and Water Conservation.

Marc S. Greenberg is a Senior Environmental Toxicologist at the Environmental Response Team Center of the U.S. Environmental Protection Agency in Edison, NJ. He is working at EPA through an Interagency Personnel Agreement between Wright State University, Dayton, OH and the U.S. Government. Marc's research and past professional experience include extensive work in both mammalian and aquatic toxicology. He obtained a B.A. in Zoology and a M.S. in Aquatic Toxicology from Miami University, Oxford, OH in 1990 and 1993, respectively, and a Ph.D. in Biomedical Sciences from Wright State University, Dayton, OH in 2002. During his graduate studies, Marc conducted field research at numerous Superfund sites including the Warm Spring Ponds Site on the Clark Fork River (MT), the Eastland Woolen Mill (ME), the Nyanza Chemical Waste Dump (MA), and the Housatonic River (MA). Dr. Greenberg was a Visiting Scientist at the Great Lakes Environmental Research Laboratory, National Oceanic and Atmospheric Administration, Ann Arbor, MI from 1999-2002 where he collaborated with scientists from the U.S. and Europe. From 1998-2001 he was a consultant to AquaQual, Inc. From 1995-1997 he was a Toxicologist at the Air Force Research Laboratory Toxicology Division, Wright-Patterson Air Force Base, OH.Bob Nicholson is Chief of the Hydrologic Simulation Program of the USGS New Jersey District. He plans and directs hydrologic modeling research and investigations in support of water-resource management activities of cooperating agencies, and he is the USGS liaison to the Barnegat Bay National Estuary Program. He received his MS degree in Environmental Engineering from Drexel University.

Chi Ho Sham is a Vice President and Senior Scientist at The Cadmus Group, Inc. He has 20 years of experience in water quality and drinking water protection issues. Dr. Sham received his doctoral degree from the State University of New York at Buffalo in 1984 with a focus on hydrology and geographic information system applications. Before joining the consulting field, Dr. Sham was a faculty member at the Boston University's Center for Energy and Environmental Studies from 1982 to 1992. He currently serves as a Director on the Ground Water Protection Research Foundation and as the Vice Chair on the Source Water Protection Committee of the American Water Works Association.

Short Course Description

Recognizing and understanding that groundwater and surface water is a single resource is critical for assessing water resources and contaminant transport issues within a watershed. Groundwater provides up to 50% of surface water flow in many parts of the US. Over development of groundwater will significantly impact quantity of surface water available to the environment (in-stream flows). Contaminants in groundwater, from both point and nonpoint sources, can significantly impact surface water quality and should be considered in Total Maximum Daily Load analysis. Understanding the remediative capacity of riparian zones and groundwater/surface water transition zones is critical for minimizing contamination of surface water from groundwater. Quantifying groundwater/surface water interactions is important to determine present baseline conditions that can be used to evaluate future quality and quantity changes. Specific examples of interactions in varied geographic settings such as costal areas and karst systems will be examined. Approaches for quantifying interactions including those based on surface water data, groundwater data, ecological data, geophysical approaches, and numerical modeling will be discussed. Developing a comprehensive conceptual understanding of interactions between groundwater and surface water will provide a basis for sustainable development of water resources in a watershed to meet the needs of both humans and ecosystems.