CONSIDERATION OF CONTAMINANT SOURCES, PHYSICAL HYDROLOGY, AND POLICY IMPLICATIONS IN A NATIONAL DESIGN FOR MONITORING GROUND-WATER QUALITY

Wayne Lapham[1], Jeff Stoner[2], David K. Mueller[2]

[1] U.S. Geological Survey, 12201 Sunrise Valley Dr., MS 413, Reston, VA 20192, U.S.A.
[2] U.S. Geological Survey, Denver Federal Center, Bldg. 53, MS 415, Lakewood, CO 80225, U.S.A.

Biographical Sketch of Authors

Wayne Lapham has been Ground-Water Specialist for the U.S. Geological Survey's National Water-Quality Assessment (NAWQA) Program for the past 10 years. Prior to that he worked on numerous ground-water studies in the USGS New England and Indiana District Offices. During his 27 years as a hydrologist with the U.S. Geological Survey, Jeff Stoner has participated in numerous studies of ground water and water quality in Montana, Pennsylvania, Minnesota, and North Dakota. Jeff currently is the chief of the nutrients synthesis project for the National Water Quality Assessment (NAWQA) Program and resides in Denver, CO. In June 2002, he will be the chief of the USGS district office in Minnesota. Dave Mueller has worked on the National Synthesis Project for the U.S. Geological Survey's NAWQA Program since 1992. He was recently named interim leader of the group responsible for trend analysis.

Abstract

Plans for the next decade of the USGS National Water-Quality Assessment (NAWQA) Program build on results from 225 studies of about 27 wells each sampled during 1991—2001 and used to assess water quality in selected major aquifers and in shallow ground water beneath agricultural and urban-suburban land. A subset of 69 studies will be revisited for assessing water-quality trends over 10-years—a relatively short time with respect to land-use change and typical ground-water age. Ten years, however, can be a long time for some policy decision makers, so the most vulnerable aquifers are among those targeted for resampling. Surrogates for nonpoint source terms including inputs of nitrogen, herbicide use, population density, and population growth were coupled with aquifer susceptibilities estimated from soil texture, aquifer permeability, climate, and irrigation intensity to systematically select study areas for resampling. Water-quality data from the 1990's were used to verify that many selected aquifers were indeed among the most vulnerable to land-surface contamination. Deeper, geologically protected aquifer systems were selected by amount of water used for drinking and primary lithology to focus on 16 principal aquifers across the nation. Nesting of study scales is planned to compare quality of varying ages of ground water as related to history of land use. Water-quality constituents will include most of a broad suite of pesticides, nutrients, volatile-organic compounds, radionuclides, and trace elements that were used during the first decade of NAWQA. Experience has shown the value of collaboration with government agencies, academia, and the private sector. Many collaborators contribute ancillary data, such as well construction, water use, geology, land use, and chemical use necessary to understand relations of water quality to land and water use. Effective communication of this understanding is intended to assist resource managers in setting priorities for protecting quality of ground water.