

EVALUATING TEMPORAL CHANGES (TRENDS) IN GROUND-WATER QUALITY ACROSS THE UNITED STATES

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ABSTRACT

During the 1990's, the U.S. Geological Survey's (USGS) National Water Quality Assessment (NAWQA) program began assessing the status of ground-water quality in major hydrogeologic and land-use settings across the country and linking ground-water-quality status with an understanding of the natural and anthropogenic factors that affect water quality. During the 2nd decade of studies (2002-2012), trends in ground-water quality are being assessed with a focus on the following major themes:

Trends Detection – in which data from ground-water networks that have been re-sampled on a near-decadal timeframe are analyzed to identify temporal changes in ground-water quality and to correlate observed trends with explanatory factors such as changes in land use, chemical use, or agricultural-management practices. This analysis provides a broad overview of trends in ground-water quality across a wide range of hydrogeologic settings and in major urban and agricultural areas that vary in dominant use patterns and crop types.

Understanding Governing Factors – in which data from selected ground-water studies are being synthesized and analyzed to identify the primary natural and anthropogenic factors that govern the degree and magnitude of observed trends in ground-water quality. For example, water-quality data from select cross-sectional studies have been linked with apparent-age estimates to demonstrate how unsaturated zone thickness and redox conditions control differences in trends and transformations of nitrate and pesticide compounds along inferred flow paths in differing hydrogeologic settings.

Simulation and Forecasting – in which information on historical changes in land use or chemical use are integrated with an understanding of ground-water flow patterns and rates to simulate measured water-quality conditions and to forecast future conditions based on anticipated changes in land use or chemical use. These studies provide valuable information to decision-makers regarding the likely effects of differing management options on water-quality at receptors such as streams or supply wells and how those effects are controlled by hydrogeologic setting.

Periodic assessments of trends in ground-water quality will be reported through release of data and associated analysis on the Web as well as through USGS publications, journal articles and presentations at conferences.

KEY WORDS

Trends, Ground Water, Water Quality