

Modeling integrates information to estimate risks of nitrate contamination to shallow ground water

Models can integrate information on chemical use, land use, and environmental factors to help explain water-quality conditions over broad geographic regions. One USGS model, based on nationwide data, was developed to estimate the risk of nitrate contamination to shallow ground water across the United States.⁽³⁰⁾ The model integrates nitrogen inputs and aquifer vulnerability by use of Geographic Information System (GIS) technology. Nitrogen inputs include commercial fertilizer and manure application rates, atmospheric contributions, and population densities (the latter representing residential and urban nitrogen sources, such as septic systems, fertilizers, and domestic animal waste). Aquifer vulnerability is represented by soil-drainage characteristics—the ease with which water and chemicals can seep to ground water—and the extent to which woodlands are interspersed with cropland.

Nitrate concentrations measured in the first 20 Study Units generally conform to the national risk map. Nitrate concentrations are expected to be lowest in the areas shown in green, where nitrogen inputs and aquifer vulnerability are lowest, and highest in the areas mapped in red, which represent regions where nitrogen inputs and aquifer vulnerability are highest. **Anticipating where and what types of nitrate conditions exist can help focus regional or national water-management goals and monitoring strategies on the most vulnerable areas.**

Use of the risk map to identify and prioritize contamination at a more detailed level than presented here is not advised because local variations in land use, irrigation practices, aquifer type, and rainfall can result in nitrate concentrations that do not conform to risk patterns shown at the national scale.

