

Title: Water Quality of Private Wells in Suburban NH and Impacts of Land Use

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Presentation or Poster

Category 1 - Land Use Impacts on Private Well Water Quality

Abstract

The impact of land use such as urbanization and agriculture are known to negatively impact surface water quality, but the impact of these landscape characteristics on groundwater quality is poorly understood. In New Hampshire, 60% of the population relies on groundwater and 40% of the state population relies on private wells which are not regulated and rarely monitored. We sampled 143 private wells contained primarily within the Lamprey River basin in southeast NH where development rates are high and most residents rely on private wells and septic systems. Samples were collected seasonally (summer 2004 to spring 2005) and analyzed for several water quality parameters including organic matter, nitrogen species, sodium, chloride and metals. Mean groundwater nitrate exceeded 4 mg N/L in 5 wells, chloride exceeded 250 mg/L in 13 wells, sodium exceeded 20 mg/L in 66 wells, arsenic exceeded 10 µg/L in 13 wells, lead exceeded 15 µg/L in one well and uranium exceeded 30 µg/L in 18 wells. Land use within a 500 m buffer explained a significant but small proportion ($p < 0.01$; r^2 0.05-0.10) of variance in groundwater constituents. Nitrate concentrations were correlated with % urbanization, salt concentrations were correlated with % impervious surfaces and arsenic was correlated with % agriculture. Although private wells are not regulated, 21% of the private wells exceeded the public water supply MCL for nitrate, arsenic, lead or uranium. An additional 38% of the wells exceeded advisory limits for nitrate, chloride or sodium. Our data show that over half of the private well users are exposed to contaminants that are cause for health concern and that nitrogen loading from human activities (e.g. septic systems, fertilizers), road salting of impervious surfaces, and agriculture and natural bedrock geology contribute to the contamination of groundwater in southeastern NH.