An integrative investigation of the sources and effects of groundwater contamination for local communities and homeowners in North Carolina

Drinking water from private wells is currently unregulated in the United States. While the federal Safe Drinking Water Act and North Carolina's drinking water standards protect consumers of public water systems, there are no similar protections for the safety of private wells. Currently about two million residents in North Carolina are served by private wells and this number is rapidly growing. In some areas of western (Blue Ridge Mountains) and central parts (Piedmont Province) of North Carolina, the levels of natural contaminants in the local ground water exceed the EPA maximum contaminant level (MCL). High levels have been particularly reported for the contents of radon, radium, and arsenic in local groundwater.

Here we report on a new USDA project that investigates different aspects related to the occurrence of natural contaminants in private wells in North Carolina. The project aims to investigate the mechanisms in which the natural contaminants are leached from the host aquifer rocks into groundwater, the available, performance, and cost of treatment techniques for removal of natural contaminants in a private home level, the role of information as an environmental health policy tool that examines how households respond to information on inorganic contaminants, and the policy implications for an increasing population that uses groundwater with contaminant levels exceeding EPA regulations.

Our preliminary results show a direct relationship between the geological formations and natural contaminants distribution in the associated groundwater. In the Blue Ridge Mountains, groundwater overlying granitic rocks of the Blue Ridge Belt is characterized by high radon level (as high as 45,000 pCi/L) that exceeds EPA's recommended MCL of 300 pCi/L and the EPA alternate MCL of 4000 pCi/L. In the Slate Belt, in the central part of NC, groundwater with high arsenic concentration that exceeds the EPA's MCL level of 10 ppb is associated with volcanic and volcaniclastic rock of the Carolina Zone. In the center-eastern part of NC, groundwater with both high radon and radium activities (above the EPA's MCL level of 5 pCi/L) is associated with granitic and genesis rocks of the Raleigh Belt. The occurrence of high levels of both radium and its radioisotope daughter radon is a unique phenomena since in most cases radium tends to be adsorbed onto the aquifer rocks from which radon is recoiled.