

A Community Solution to Address Extensive Nitrate Contamination in the Lower Yakima Valley Aquifer

Authors : Melanie Redding

Abstract : Historic widespread nitrate contamination of the Lower Yakima Valley aquifer in Washington State initiated a community-based effort to reduce nitrate concentrations to below-drinking water standards. This group commissioned studies on characterizing local nitrogen sources, deep soil assessments, drinking water, and assessing nitrate concentrations at the water table. Nitrate is the most prevalent groundwater contaminant with common sources from animal and human waste, fertilizers, plants and precipitation. It is challenging to address groundwater contamination when common sources, such as agriculture, on-site sewage systems, and animal production, are widespread. Remediation is not possible, so mitigation is essential. The Lower Yakima Valley is located over 175,000 acres, with a population of 56,000 residents. Approximately 25% of the population do not have access to safe, clean drinking water, and 20% of the population is at or below the poverty level. Agriculture is the primary economic land-use activity. Irrigated agriculture and livestock production make up the largest percentage of acreage and nitrogen load. Commodities include apples, grapes, hops, dairy, silage corn, triticale, alfalfa and cherries. These commodities are important to the economic viability of the residents of the Lower Yakima Valley, as well as Washington State. Mitigation of nitrate in groundwater is challenging. The goal is to ensure everyone has safe drinking water. There are no easy remedies due to the extensive and pervasiveness of the contamination. Monitoring at the water table indicates that 45% of the 30 spatially distributed monitoring wells exceeded the drinking water standard. This indicates that there are multiple sources that are impacting water quality. Washington State has several areas which have extensive groundwater nitrate contamination. The groundwater in these areas continues to degrade over time. However, the Lower Yakima Valley is being successful in addressing this health issue because of the following reasons: the community is engaged and committed; there is one common goal; there has been extensive public education and outreach to citizens; and generating credible data using sound scientific methods. Work in this area is continuing as an ambient groundwater monitoring network is established to assess the condition of the aquifer over time. Nitrate samples are being collected from 170 wells, spatially distributed across the aquifer. This research entails quarterly sampling for two years to characterize seasonal variability and then continue annually afterward. This assessment will provide the data to statistically determine trends in nitrate concentrations across the aquifer, over time. Thirty-three of these wells are monitoring wells that are screened across the aquifer. The water quality from these wells are indicative of activities at the land surface. Additional work is being conducted to identify land use management practices that are effective in limiting nitrate migration through the soil column. Tracking nitrate in the soil column every season is an important component of bridging land-use practices with the fate and transport of nitrate through the subsurface. Patience, tenacity, and the ability to think outside the box are essential for dealing with widespread nitrate contamination of groundwater.

Keywords : community, groundwater, monitoring, nitrate

Conference Title : ICGMM 2022 : International Conference on Groundwater Monitoring and Management

Conference Location : New York, United States

Conference Dates : January 28-29, 2022