NSERC Canadian Network for Aquatic Ecosystem Services

Theme II, Project 3, Linking Land Cover to Groundwater Nitrate: Approaches in Cross-Border Monitoring

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Abstract

Landscape patterns impact ecological and hydrologic dynamics of aquatic systems, including systems spanning international boundaries. Agricultural land use patterns and practices are among factors responsible for elevated groundwater nitrate (NO_3^-) concentrations. These patterns can vary across political jurisdictions which is problematic for cross-border water resource management as coordination of landscape monitoring across political boundaries is challenging. To address this issue, we examined the Abbotsford-Sumas Aquifer (ASA) which provides drinking water to over 100,000 people in British Columbia and Washington. We asked: Are there linkages between land use patterns surrounding groundwater wells and elevated NO_3^- concentrations? High spatial resolution imagery (i.e. LiDAR, RapidEye) were used to quantify fine scale features with suspected mechanistic links to NO_3^- sources. NO_3^- concentrations in shallow wells were examined using data collected by various agencies. Surrounding each well, terrestrial zones of influence were delineated and landscape patterns were characterized. Multiple regression was used to assess relationships between land use and NO_3^- concentrations. Preliminary results show positive correlations between area of raspberry renovations and mean NO_3^- concentrations. This work represents an important first step in the development of affordable monitoring approaches for trans-border water resources.

Keywords: Groundwater, Aquifer, Nitrate, Contamination, Water Quality

Geographic Location: Abbotsford-Sumas Aquifer; Abbotsford, British Columbia, Canada / Lynden, Washington, USA

How does your project link to Canadian aquatic ecosystem services?

Groundwater, though less visible and not as well understood as surface water, is an essential and vital resource for about a quarter of all Canadians. Nitrate contamination of groundwater is a serious concern in areas of intensive agriculture. This project seeks to bring public awareness to groundwater quality issues as well as improved agriculture management strategies and methodologies for monitoring groundwater quality.