

WATER QUALITY IN METRO VANCOUVER

Local and regional nutrient monitoring and water quality assessment in urban and periurban streams in the Vancouver region, British Columbia 2013-2016

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The impacts of land cover, urbanisation and seasonality on water quality in Vancouver, Canada, a city which has experienced rapid population growth over the past 50 years, were studied. The results provided insight into seasonal water quality patterns in streams and creeks across a major metropolitan region and their broad relationships to watershed agricultural, forest, and urban land. Citizen scientist-collected data allowed spatial and seasonal relationships to be explored more closely. *Shupe, S. (2017) Sci Total Environ.*

Aims

The study aimed to explore the impacts of land cover and urbanisation on water quality at local and regional scales, and at different times of the year. Citizen scientists' measurements allowed researchers to gain a much higher resolution than would otherwise be feasible.



Approach

Between June 2013 and July 2016, 750 samples were collected by FreshWater Watchers across 49 streams.

The streams represented a variety of watersheds containing a range of urbanized, forest covered and agriculture land cover across Metro Vancouver.

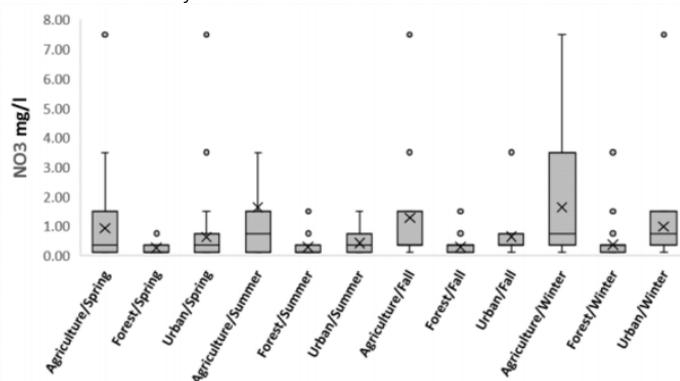
FreshWater Watchers collected data on dissolved nutrient (nitrate and phosphate) concentrations, turbidity, water level and flow, vegetative conditions (stream bank and aquatic vegetation), presence of impacts (algae, litter, foam). These data were combined with satellite imagery data to identify the primary landuse type where each sample was taken, the watershed the sample fell within, the width of each stream, as well as temperature and rainfall data, downloaded from Environment Canada.

Impacts

Citizen science can provide important water quality and site condition information to characterize freshwater conditions and impacts on them. Continued data collection from citizen scientists will be essential in monitoring and modeling stream ecosystem impacts across the region given projected population growth.

Key results

- The study showed the importance of improved spatial and temporal resolution in understanding temporal dynamics of stream water quality.
- The relationships of nutrients to land cover proportions varied yearly, seasonally, and sub-regionally.
- Nitrate concentrations were most sensitive to land cover. They were positively correlated with agricultural land use and negatively with forest land cover.
- Phosphate concentrations were less sensitive, but were lower where forested land was present.
- Both urban and agricultural land cover were significantly associated with an increase in water conductivity.



Nitrate variation across watersheds in Metro Vancouver between 2013-2016. Figure shows the variation in nitrate between different land-use types (highest in areas of agricultural land) and seasons of the year.