Residential land contributes higher C, N, and P to streams in Oswego County, New York

How does change in land use impact the water chemistry parameters in the streams of Oswego County, NY?

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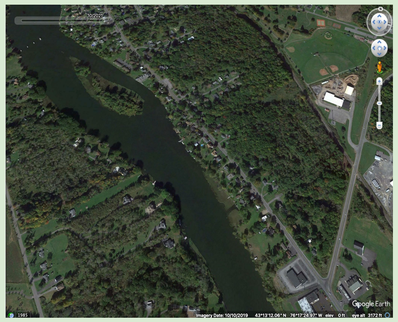
Introduction

- Land use within a watershed is closely tied to stream water chemistry.
- We studied the relationship between land use and stream water chemistry for Oswego County, New York, because riparian zones in this county have shifted to residential from agricultural and forested land uses.

Methods

- Chemistry and some land use data was collected from the New York State DEC Monitoring Portal.
- Sites without land use data were assigned a dominant land use by using Google Earth Pro.
- Because of insufficient sampling, statistical tests were not possible for comparing Kjeldahl nitrogen, orthophosphate, and dissolved organic carbon across dominant land use of sample sites. Comparisons were made graphically with the *ggplot2* package (Wickham 2016) in the R Programming Environment (R Core Team 2022).



Acknowledgements

We would like to thank the Oswego County Soil and Water Conservation District, the members of the Yang research lab, and SUNY Geneseo for helping us with this analysis. The data used was collected by the NYS Department of Environmental Conservation Department of Water.

A special thank you to the Native Americans that paid the ultimate price. These data were collected and processed on the homeland of the Seneca Nation of Natives and Tonawanda Seneca Nation of the Haudenosaunee, who were unfairly forced to cede their lands during European settlement of their region. We offer this acknowledgment as an act of repentance and to acknowledge we are the benefactors of an unjust genocide. As the original stewards of this land were removed and their descendants still do not have free access to the entirety of their ancestral lands, we recognize our responsibility to understand the current state of nature and what our daily impact is.

References

H. Wickham. ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2016.

R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

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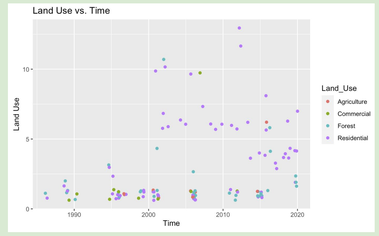
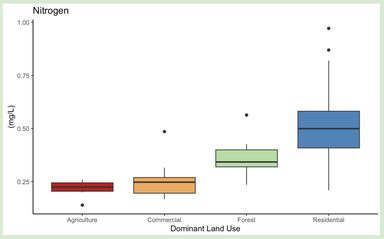
("Apartment River House", https://www.trivago.com/en-US/oar/entire-house-apartment-river-house-15ft-from-the-water-athens?search=100-24826056).

Results

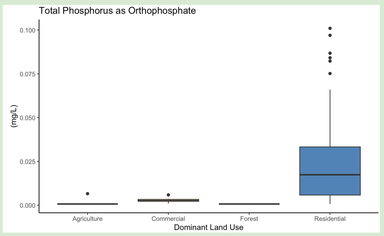
Residential land use has become the most common type of land use in Oswego County.



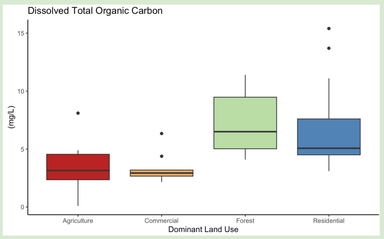
Kjeldahl N appears to be highest at residential sites



Orthophosphate appears to have high concentrations at residential sites



In contrast, total carbon was similar across most land use types, except forested sites had higher total carbon than commercial sites.



Discussion

- Residential land use appears to have the highest negative impact on stream water quality. Previous studies show that urbanization increases the amount of impervious surfaces that result in higher amounts of runoff and pollution in the water (Giri et al., 2016).
- Our ability to compare the impacts of land use types on C, N, and P was limited by sampling history in Oswego County, which illustrates the importance of consistent water monitoring.
- We recommend sampling from sites more evenly across different land uses, and more regularly.
- Overall, it is important to pay attention to how human activities impact stream water quality because of how easily disturbed a fluvial ecosystem is.