

# SCC: Smart Water Crowdsensing: Examining how innovative data analytics and citizen science can ensure safe drinking water in rural versus suburban communities

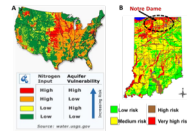
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## Project Vision:

- Develop a citizen science based Smart Water Crowdsensing (SWC) framework using interdisciplinary approaches
- Promote public health and increase the resident awareness of drinking water quality in private well dependent communities

## Community-identified Problem:

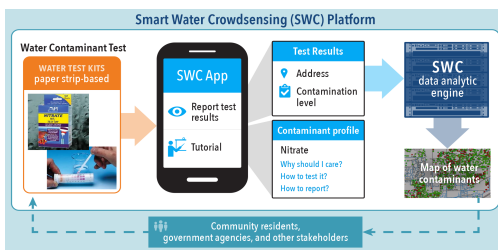
- Northern Indiana has been identified as a hotspot for groundwater nitrate contamination.
- Community Partners:
  - St. Joseph County Environmental Health Department
  - Penn-Harris-Madison School Corporation



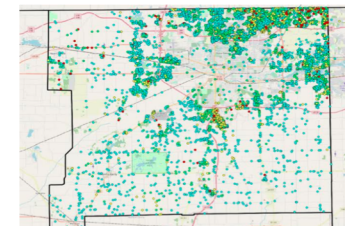
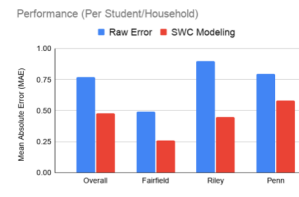
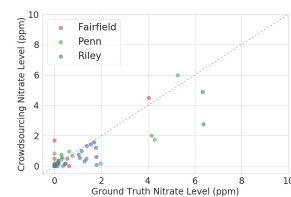
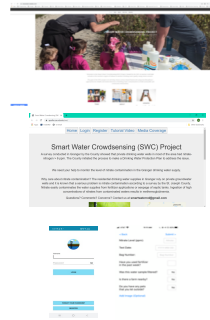
## Intellectual Merit:

- Technological:
  - It is feasible to obtain reliable crowdsensing data on drinking water contamination using unreliable crowd sensors for community level well water monitoring.
- Social:
  - By comparing different community types (suburban, urban, and rural), it is found that the socio-demographic qualities may influence crowdsensing participation and data quality.

## Project Activities:



Successfully implemented SWC in the well water dependent communities in in South Bend, Granger, and Goshen (IN).



Results showed that crowdsensing water measurement errors were in the range of 0-2 mg/L nitrate-N, suggesting the feasibility of using the developed crowdsensing framework to monitor groundwater nitrate contamination. Our SWC data analytic model also significantly reduces the crowdsensing errors.

GIS maps were created based on nitrate monitoring data in collaboration with the St. Joseph County Health Department.

## Broader Impact:

- The SWC project increased public awareness of importance of well water safety and empowered the residents with knowledge to protect their own water and health.

Pre- and post-surveys and focus group meetings with crowdsensing participants showed that participation in the SWC crowdsensing experiment could improve their knowledge on groundwater quality and protection.

## Broader Impact (cont'd):

- The local government implemented important changes in Granger community: sewer and city water



• [https://www.southbendtribune.com/news/local/ground-zero-in-groundwater-debate-granger-subdivision-to-have-sewers-treated-water/article\\_e60e4fa0-67c1-11eb-b674-e7d799a1d715.html](https://www.southbendtribune.com/news/local/ground-zero-in-groundwater-debate-granger-subdivision-to-have-sewers-treated-water/article_e60e4fa0-67c1-11eb-b674-e7d799a1d715.html)

## Next Steps:

- The team plans to improve the data analytic models in SWC by analyzing the sensing measurements collected from the crowdsensing data and lab validation data.
- The team will expand the crowdsensing experiments in different communities to further validate the generality of the SWC framework.
- The team will collaborate with the school teachers to incorporate the project into educational goals so as to optimize the approach to recruit and engage participants through school systems. We will also design alternative approach for teachers in need during the pandemic.