



Combining Hands-on Field Experience with Data-Driven Hydrology Education Tools



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Abstract:

The Teen Shale Network is a multi-year project that focused on two primary objectives: first, to monitor the quality of water in the Black Moshannon Creek, which is in close proximity to active hydraulic fracturing sites, and second to engage students in authentic field research in collaboration with experts. Looking forward, the Teen Shale Network will focus increasingly on using data-driven hydrology tools, such as HydroDesktop to complement scientific concepts that were taught through the students' field work by publishing field data in the CUAHSI Hydrologic Information System. Using CUAHSI WDC tools, students will be able to learn the complete lifecycle of data, from creation to publication to analysis to reuse.

Course of Action:

Groups of students made several trips to Black Moshannon State Park and Black Moshannon Creek at Gorton Road (photo 1). To study particles in the water, the students collected and filtered water samples (photo 2), and used a SonTek FlowTraker (photo 3) to measure stream flow velocities. Finally, the students used the hand-held HORIBA U-53 monitor (photo 4) and SympHony pH probe (photo 5) to measure pH, dissolved oxygen, water level, electrical conductivity, air and water temperatures, turbidity, and ORP (photo 6).



Map courtesy of Susquehanna River Basin Commission Water Resource Portal (www.gis.srbc.net/wrp/). Gas pads approved by rule (orange icon) or awaiting approval (yellow triangle).

Our Perspectives:

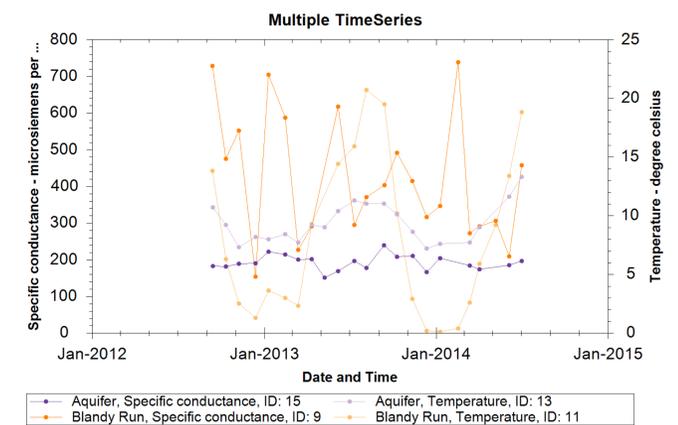
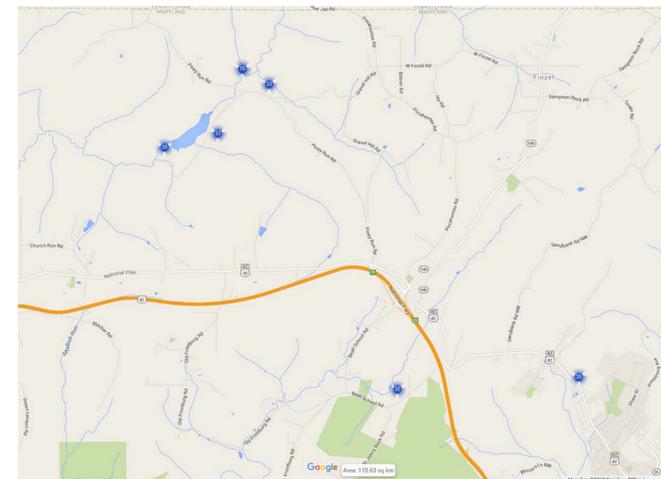
"I feel like in the classroom you learn more about theory, and in the field you apply what you learned," said Valeria Soler Pelaez, a 9th grader. "You make more connections to the real world. And I feel like this helps it stay in your brain. It helps you remember by making these connections you've never thought about."

"Not only can you gather realistic scientific data, but it's for a cause," said Emily Redmond, an 8th grader. "I think the experience can encourage students to learn more about fracking and its effects on the environment. It's a once in a lifetime opportunity because I bet not many other people are doing this kind of experiment."

Moving Forward:

The 2015-2016 academic year is the 4th year of the project. Plans for this year include:

- Independent study credit for participants, full academic year commitment
- Inquiry-based science: evolution from ideas and data gathering, to data analysis, comparisons with big data, and science communication.
- Application of water quality monitoring field techniques used by research and government scientists
- Reflective journaling on meeting days
- Hands-on software training with HydroClient and HydroDesktop applications
- Develop office productivity skills to visualize and format collected data
- Utilize PITT Mobile Science Laboratory to analyze samples
- Compare and contrast TSN State College data with TSN Mountain Ridge data and local USGS sites
- Assessment of program goals and accomplishments



Above Left: Google Map, derived from CUAHSI HIS HydroClient (www.data.cuahsi.org) of the Mountain Ridge High School monitoring locations in Garrett County, MD. **Above Right:** Time series data from two sites under investigation by Mountain Ridge High School. Graph was created in HydroDesktop 1.6.13 with Shale Network Plugin. **Data** available at ShaleNetwork Database. DOI: 10.4211/his-data-shalenetwork

Future Goals:

The future of this TeenShale Network chapter is to continue to monitor the current sites and to teach more students the skills needed to maintain water quality monitoring. The program is evolving and the leaders are exploring ways to further enrich the experience as place-based science education for the students to help them make connections to their future careers.



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