



Allegheny
Monongahela
Ohio



3 Rivers Quest Origins

- Started in 2009 to address increased TDS in Monongahela River
- Identified treated mine drainage as a cause for increased TDS
- Created a model for mine pumping and treatment plants discharges to avoid exceeding the Safe Drinking Water Act (SDWA)
- The Monongahela River was removed from EPA 303(d) list of impaired streams

3 Rivers Quest Today

- Monitors the Monongahela River, Allegheny River, and Ohio River
- Utilizes academic institutions, community science, and conservation groups
- Provides data to characterize trends in water quality over time and identify pollution sources

Monitoring includes:

- pH
- Conductivity
- Total Dissolved Solids (TDS)
- Total Suspended Solids (TSS)
- Bromide, Chloride, & Sulfate
- Metals
- Alkalinity & Acidity

Colcom Foundation

3RQ Resources Available

- [WATERS](#)
- [3RQ Mapping Tool](#)
- [GAPS Assistance](#)
- Targeted studies



About Common Waters

- Provides WVU students with opportunities to participate in STEAM projects
- Students are connected to local watersheds to complete projects that benefit them and the communities they serve
- Allows students to apply knowledge and skills to real-world environmental issues and provides research and technical assistance to watershed groups

Watershed Group Participation

- WVWRI will work with watershed groups/similar environmental nonprofits in West Virginia and Pennsylvania
- Can pair students to watershed groups requesting assistance for:
 - Creative ventures (e.g., video production, photography, art displays)
 - Collection/analyzation of water quality data
 - Evaluation of erosion and sedimentation
 - GIS
 - Research topics in the literature, performing interviews, etc.
 - Preparation of newsletters, infographics, or social media posts
 - Restoration planning

Teaming up with Common Waters

Watershed groups will:

- Meet with students several times during the semester
- Provide materials i.e. background information, files, etc. to students for the project
- Offer feedback and help grade students' work with WVWRI at the end of the semester

Common Waters will:

- Serve as liaison between watershed groups and students/professors
- Provide students with project ideas based off watershed group's needs
- Provide funding for supplies and travel to support students projects
- Provide technical assistance to student projects i.e. using the water quality database, mapping tool, etc.
- Organize symposium to bring together WVU students and watershed groups to share projects

How Watersheds Can Get Involved

- Email Rachel Spirnak (rachel.spirnak@mail.wvu.edu) or Amaya Hamilton (amaya.hamilton@mail.wvu.edu) a project idea and we will reach out to classes/students to find a suitable student to take on project
- WRI will reach out with specific project ideas for certain classes/students who need a project
- Not all students will be able travel to sites for in person work

Student Opportunities to Get Involved!

- Through the Purpose to Action Program! This was my path, I applied for P2A and choose WVWRI to work with this semester
- Through research programs! Either SURE (Summer Undergraduate Research Experience) program or RAP (Research Apprenticeship Program); either can be completed in conjunction with WRI
- Volunteer experiences!

My experience with WRI

- My experience with WRI has been **educational and enjoyable**; staff are warm, inviting and patient
- Understanding with my busy class and extracurricular schedule
- Allotted time to learn and educate myself on pressing issues with regards to ethical practices
- Collaborative and interesting material!
- Feels important and relevant information to be learning about and educating others on



How Students Can Get Involved

- Email Rachel Spirnak (rachel.spirnak@mail.wvu.edu) or Amaya Hamilton (amaya.hamilton@mail.wvu.edu)
- Sign up for the [Rivers Run Through This](#) newsletter
- WVWRI will be posting information on Facebook (West Virginia Water Research Institute) and a newly launched Instagram (@wri_wvu) page

Project Highlights

2023 HIGHLIGHTS

OF THE BUCKHANNON RIVER WATERSHED ASSOCIATION

1,580

POUNDS

of trash were collected from the Buckhannon River by volunteers!

- ★ **WATER QUALITY**
 BRWA's dedicated volunteers continued to monitor and maintain our acid mine drainage treatment sites on Swamp Run.
- ★ **COMMUNITY CONNECTIONS**
 Over 100 people attended the 7th Annual Buckhannon RiverFest! People of all ages gathered to celebrate clean water and community.
- ★ **BUCKHANNON RIVER PADDLERS**
 BRWA's new community paddle group, the Buckhannon River Paddlers, hosted monthly paddles to celebrate recreation on the Buckhannon River.

BRWA received a \$5,000 Stream Partner Grant to continue water quality improvement initiatives.

For 22 years, the Buckhannon River Watershed Association has worked for clean water in the community. In 2023, they continued to promote and protect the Buckhannon River and its clean water which sustains so much life.

WATERSHED COLLABORATION

BRWA board members attended the WV Watershed Symposium in Canaan Valley to network and learn from other watershed groups across the state.

BRWA is grateful for a new Partnership with Try This West Virginia to provide free kayak rentals to help more people experience the Buckhannon River.

BUCKHANNON RIVER WATERSHED ASSOCIATION

BUCKHANNONRIVER.ORG

SOURCE: BUCKHANNON RIVER WATERSHED ASSOCIATION. (2023). BRWA 2023 NEWSLETTER.

ACID MINE DRAINAGE IN THE BUCKHANNON RIVER

WV WATER RESEARCH INSTITUTE

ROUGHLY 400

MILES

of freshwater trout streams in WV are impaired due to acidity. The majority emanate from acid mine drainage.

- »»» **SWAMP RUN 1 TREATMENT SYSTEM**
 This combines several AMD seeps and channels them to limestone flushing beds, settling ponds, and a small wetland. The limestone within this system helps to raise the pH, which in turn allows metals to drop out prior to entering Swamp Run. The settling pond and wetlands help to slow the water movement down and help remove any remaining metals. This treatment system was established in 2016 and current data demonstrates the effective removal of iron and acidity through the system.
- »»» **SWAMP RUN 2 TREATMENT SYSTEM**
 This has two main seeps - North and South. The current treatment system focuses on treating the south seep, which is shown to be more detrimental from water quality monitoring. Construction for the original treatment system was completed in 2020 and funding to improve the North seep treatment was awarded in 2022.
- »»» **CURRENT TREATMENT**
 This includes limestone terracing, limestone flushing beds, and settling ponds to raise the pH and remove metals from the water before entering Swamp Run.

Abandoned mines have the ability to continue producing AMD for thousands of years after mining operations have ceased.

WHO IS THE WV WATER RESEARCH INSTITUTE?

WVWRI was formed under the federal Clean Water Act. Since 1967, the organization has been serving the people of the mountain state by developing solutions for environmental and economic issues and disseminating results to the public and government. WVWRI is divided into four distinct programs: Brownfields, Critical Materials, Energy, and Water to best address the needs of the state. WVWRI's primary focus is acid mine drainage remediation, with current research looking into the extraction of rare earth elements during the treatment process.

Acid mine drainage (AMD) forms when pyrite-rich geology is exposed to surface water, often during mining operations. The water and pyrite react to form sulfuric acid and release iron. The resultant acidic conditions leach heavy metals and lower the pH of the receiving body of water.

IMPACT OF THE SWAMP RUN TRIBUTARY

Prior to treatment, Swamp Run was adding roughly 84,000 pounds of acid per year into the Buckhannon River. Post-treatment data shows that these loadings are close to zero at the mouth of Swamp Run, indicating significant improvement within the creek.

The settling pond at Swamp Run 1 appears a milky color due to the aluminum settling from the water.

Limestone terracing treating the Swamp Run 2 South seep. Notice how the orange iron has coated the limestone.

BUCKHANNON RIVER WATERSHED ASSOCIATION

WV WATER RESEARCH INSTITUTE

SOURCE: SEIFERT, E., WVWRI. TREATING ACID MINE DRAINAGE IN THE BUCKHANNON RIVER. BRWA 2023 NEWSLETTER.

BRWA
Highlight
Poster

created by
Haley Paul

Project Highlights



<https://arcg.is/04vKin0>

Created by Sarah Nelson

Discussion