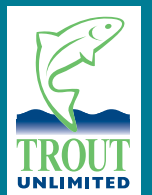


Cleaning Up Abandoned Mine Drainage

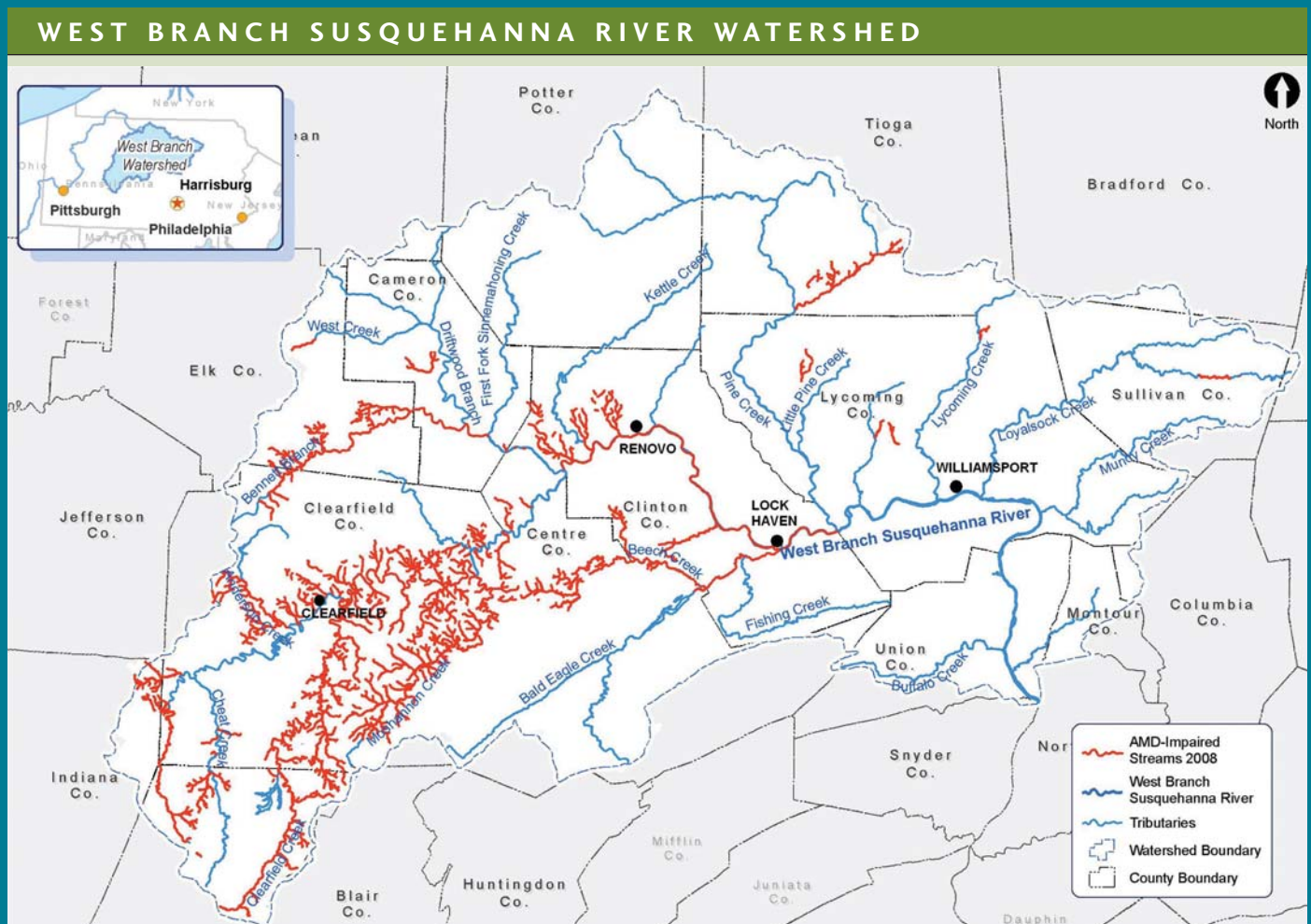
in the West Branch Susquehanna Watershed

▶ WHY IT MAKES ECONOMIC SENSE



THE AREA

The West Branch Susquehanna River watershed drains a 6,978 square-mile area in northcentral and central Pennsylvania. The majority of the mountainous area is covered with dense forests, with approximately 10% of the land used for agriculture. Half of the watershed is contained in state forest, state park, and state game lands. Nearly 75% of the watershed is located within the Pennsylvania Wilds region, a section of the commonwealth that is the focus of ecotourism and outdoor recreation.



▲ 1,205 stream miles are polluted with abandoned mine drainage (AMD) in the West Branch Susquehanna River watershed.



▲ The orange-red color of the stream bottom is from iron, a common pollutant found in AMD.

THE PROBLEM

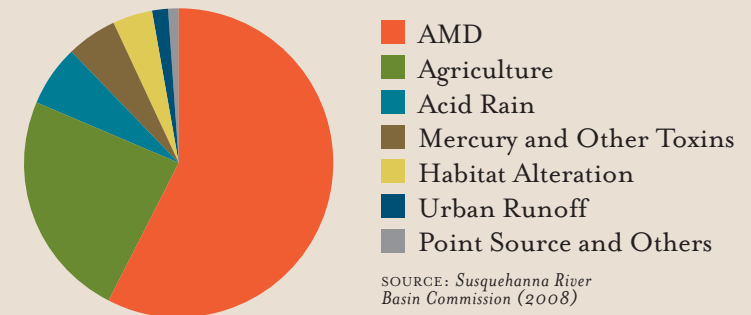
Despite the abundance of natural beauty in this region, the legacy of past unregulated coal mining continues to pollute the streams and scar the lands. Abandoned mine drainage (AMD), which is the primary source of pollution to Pennsylvania’s waterways, is the cause for nearly 60% of the pollution to streams throughout the West Branch Susquehanna watershed. Decades-old abandoned mines drain highly acidic water laden with dissolved metals which then runs through rivers and streams. This acidic water contains metals that stains the rocks an orange-red or white, and prevents fish, insects, and other aquatic life from living in the stream, leaving behind an essentially lifeless stream.

1,205 miles of streams in the West Branch Susquehanna River watershed are impaired by AMD. Cleaning up these impaired streams through AMD remediation is costly, but necessary. The short-term investment in restoration of these waters will result in a long-term economic benefit to the community.



▲ Moshannon Creek is one of the largest tributaries that contributes abandoned mine drainage to the West Branch Susquehanna River.

West Branch Subbasin Impairments



Abandoned mine drainage is the cause for nearly 60% of the pollution to streams throughout the West Branch Susquehanna watershed.

HOW AMD REMEDIATION WORKS

AMD remediation is the method used to “clean up” or improve water quality and land that has been degraded by coal mining. Some of the more common remediation approaches are collectively referred to as passive treatment methods or active treatment methods. Passive treatment typically incorporates a combination of components such as wetlands, limestone-filled channels or ponds, and ponds containing both limestone and organic compost. Active treatment methods require the addition of a chemical or other acid-neutralizing material to the AMD-impacted water. Reclamation is another mitigation alternative that restores the land to its pre-mined condition and may be done in conjunction with re-mining, which is extraction of the coal that was not removed during the original mining activities.

▶ *Passive treatment system in Babb Creek Watershed, Tioga County.*



THE INVESTMENT

One-time capital costs for remediation projects throughout the watershed are estimated to be at least \$110 million. The actual amount will depend on the type and scale of cleanup. For instance, costs could easily double or triple this amount if treatment systems are constructed to perpetually improve the water quality of the majority of AMD discharges across the watershed. Capital costs could be kept lower if more reclamation and re-mining projects are successfully implemented. However, reclamation and re-mining are not necessarily feasible, or economical, options for every site. Additional savings could be realized if further analysis demonstrates that the watershed can recover by addressing fewer AMD discharges than originally estimated.

Annual operation and maintenance costs for treatment systems could be as much as \$16 million. These costs include the purchase of chemicals or acid-neutralizing materials for active treatment systems, management and removal of accumulated metal sludge, replenishment of limestone and compost, and other expenses such as monitoring and labor for operation and maintenance activities.

Potential funding sources for remediation of Pennsylvania’s AMD-polluted rivers and streams may include the state-run Growing Greener program, the federal Abandoned Mine Land Fund, and the Office of Surface Mining Watershed Cooperative Agreement Program, among others.

Of those surveyed for this report, Pennsylvania residents say they are willing to pay \$73.6 million for environmental improvements to the West Branch Susquehanna River watershed.

The majority of the survey respondents say they would be willing to support a referendum to provide funding to clean up AMD throughout the West Branch Susquehanna watershed.

THE BENEFITS

If funds spent to remediate AMD in the watershed originate largely from outside the watershed, from fees on mined coal or from federal or state taxes, for example—then the local economic benefits are most clearly evident. But even if remediation funds originate within the watershed, several kinds of local economic benefits are realized.

As remediation of abandoned mine drainage occurs in local streams, area property values increase.

In Clearfield County alone, the total value lost by owners of the more than 2,700 parcels within 200 feet of AMD-impacted streams is estimated at more than \$2,500 per acre, or more than \$4 million in total.

Additional tax revenue would be generated from the restoration economy.

Each business or worker that receives payment for remediation work will pay taxes as the investment dollars circulate through the local economy. This boost in local tax revenue provides a significant boost to county and local governments.

More drinking water supply options become available.

Government agencies have already spent \$11 million in the watershed to correct problems caused by AMD for drinking water supplies. Clean streams would provide more plentiful and cheaper options for public and private drinking water supplies.

Local jobs are generated.

To build remediation projects, local engineers and contractors are hired. Demand for these services stimulates the local economy, thus strengthening businesses and creating jobs.

Funds that are invested in the local economy would circulate through the local economy.

For every \$1 in external funds spent on local AMD remediation, local economies receive \$1.36 – \$1.87 in local economic activity. This translates into up to \$616 million for capital expenditures and up to \$23 million annually for operation/maintenance.

AMD REMEDIATION PROVIDES JOBS

It is estimated that up to 4,120 jobs throughout the West Branch Susquehanna watershed will be created from initial capital expenditures for AMD remediation projects. These jobs include positions such as the environmental scientist who collects data and manages the AMD project, the engineer who designs the treatment system, the equipment operator who constructs the treatment system, and the truck driver who delivers the materials.



▲ As streams are restored, local businesses will benefit from the increased outdoor recreational opportunities and associated tourism.



EFFECTS OF AMD ON ANGLING

With more than 1,200 miles of polluted streams, an estimated \$22.3 million in sport fishing revenues was lost in the West Branch Susquehanna watershed due to AMD in 2006. This estimate includes lost angling opportunities in both warm and coldwater streams. The greatest loss to the angling economy occurs in the Clearfield Creek watershed where more than half of the AMD polluted streams of the West Branch are found.

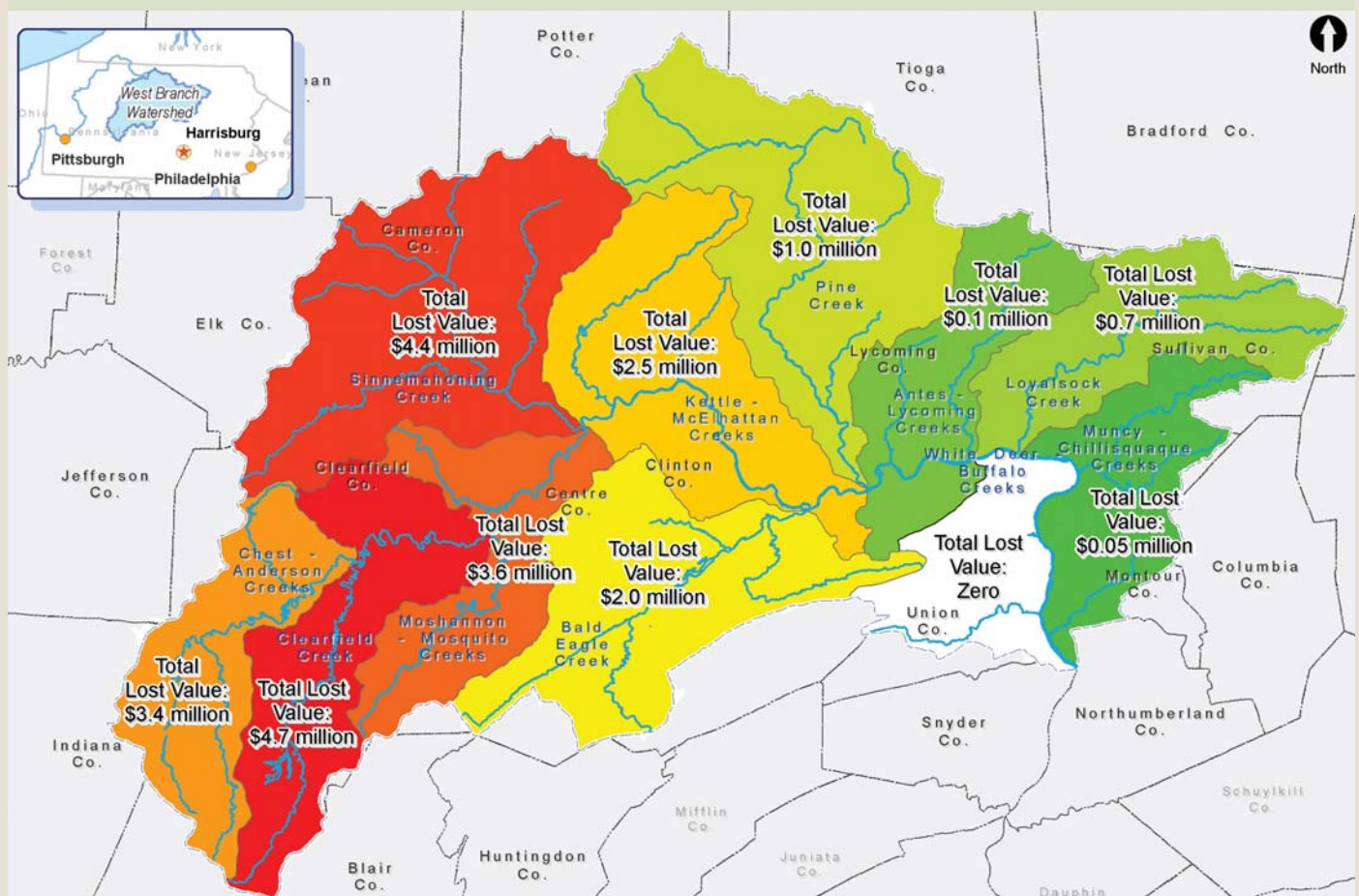
The good news is that since the physical habitat is typically already in good condition in most streams polluted with AMD throughout the watershed, fish and other aquatic life can recover relatively quickly once the water quality is improved.

- ▶ Restored streams offer increased opportunities to teach future caretakers of our watersheds about the importance of water quality and other conservation issues.



REBECCA DUNLAP

ANNUAL SPORT FISHING REVENUE LOSS



- ▲ The greatest loss to the angling economy occurs in the Clearfield Creek watershed where 638 miles of streams are polluted with abandoned mine drainage. Clearfield County alone contains just over 50% of the AMD polluted streams found in the West Branch.

REMEDIATION STRATEGY

Trout Unlimited contracted with the Susquehanna River Basin Commission (SRBC) to develop an approach to review remediation alternatives and their impact on improving water quality in the watershed. SRBC developed a database to determine the severity of existing conditions from AMD pollution and created a modeling tool that allows for the prediction of potential improvements after restoration projects are completed. The final report, "West Branch Susquehanna Subbasin AMD Remediation Strategy: Background, Data Assessment and Method Development", provides water quality conditions for major AMD problem areas, points out where more data collection is necessary, and contains potential remediation strategies for several major AMD problem areas. The document can be downloaded at www.tu.org/westbranch.

TROUT UNLIMITED AND THE WEST BRANCH SUSQUEHANNA RESTORATION INITIATIVE

Trout Unlimited established the West Branch Susquehanna Restoration Initiative in 2004. This initiative is aimed at the restoration of coldwater streams and the ultimate recovery of the West Branch Susquehanna River. As the lead non-profit organization for this initiative, Trout Unlimited provides technical assistance and organizational support to numerous volunteer-based groups in the watershed, and works closely with local, state, and federal government on a coordinated, strategic, and cost-effective AMD cleanup approach for the entire river basin.

METHODOLOGY

Trout Unlimited contracted with Downstream Strategies LLC to describe and quantify the local and statewide economic benefits that arise from remediation of AMD in the West Branch Susquehanna watershed. To accomplish this, Downstream Strategies conducted analyses to determine how money spent on remediation impacts the local economy and how restored streams impact recreational spending, property values, and drinking water supplies. Additionally, a willingness-to-pay survey was used to measure the monetary benefits from AMD remediation in the watershed among the affected general public. Further details on the methodology are found in the full report, "An Economic Benefit Analysis for Abandoned Mine Drainage Remediation in the West Branch Susquehanna River Watershed, Pennsylvania" available for download at www.tu.org/westbranch.

SUMMARY

The restoration of the West Branch Susquehanna watershed will require large capital investments and annual operation and maintenance costs. A project of this scale will require a long-term commitment from governments at the federal, state, and local levels, and the involvement and support of local stakeholders.

To make the most informed decisions possible about AMD remediation across the West Branch Susquehanna watershed, policymakers and the general public should consider not just the costs, but also the benefits. In addition to the environmental benefits, the most obvious benefit of money spent on AMD remediation is that funds are brought into the local economy to hire businesses from within the local community to design, build, and maintain treatment systems. When goods and services are provided by local businesses, jobs are created, and these dollars circulate through the economy as workers spend their paychecks on other local goods and services. A restoration economy is then created in which people work toward environmental restoration that supports local communities and improves the overall quality of life available in these areas over the long term.

ECONOMIC BENEFITS OF AMD REMEDIATION

- **Jobs are generated and local economy is stimulated**
- **Recreational spending is increased**
- **Property values are increased**
- **Drinking water supply options are cheaper and more plentiful**



ACKNOWLEDGEMENTS

Funding for the economic benefit analysis report was provided by the Richard King Mellon Foundation. Funding for the remediation strategy report was provided by the PA Department of Conservation and Natural Resources, PA Department of Environmental Protection, and the Richard King Mellon Foundation. Many thanks to members of the West Branch Susquehanna Task Force and West Branch Susquehanna Restoration Coalition for their assistance with these reports. All photos in this report are by Amy Wolfe unless credited otherwise.

FOR MORE INFORMATION ON TROUT UNLIMITED'S WORK ON ABANDONED MINE DRAINAGE IN PENNSYLVANIA, CONTACT:

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More information on the West Branch Susquehanna Restoration Initiative can also be found on the website for the West Branch Susquehanna Restoration Coalition at www.wbsrc.org.