

PROJECT facts

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Sequestration and
Environmental and Water Resources

09/2002

A HOLISTIC APPROACH TO ADDRESSING ENVIRONMENTAL ISSUES IN APPALACHIA

CONTACT POINTS

Sarah M. Forbes

Office of Systems and Policy
Support
National Energy Technology
Laboratory
304-285-4670
sarah.forbes@netl.doe.gov

Thomas J. Feeley

Environmental and Water
Resources Product Manager
National Energy Technology
Laboratory
412-386-6134
thomas.feeley@netl.doe.gov

Scott M. Klara

Sequestration Product Manager
National Energy Technology
Laboratory
412-386-4864
scott.klara@netl.doe.gov

CUSTOMER SERVICE

800-553-7681

WEBSITE

www.netl.doe.gov

Background

Water quality and availability and global climate change are critical issues affecting fossil-fuel energy production and use. These issues are particularly important within the Appalachian region as coal mining continues to be an integral part of the local economy. Reclaiming impacted mined lands can generate multiple environmental benefits, or realize economic benefits in the form of ecosystem goods and services. This project will demonstrate the potential to create novel ecosystem goods and services. Expected environmental benefits include improved water quality, enhanced carbon storage, restored wildlife habitat, increased biodiversity, and reductions in erosion, surface water runoff, and flood damage. The possibility of future pollutant trading regimes for water quality and carbon credits makes the identification and quantification of these benefits essential.

Water Quality

The goal of our nation's Clean Water Act is to "restore and maintain the chemical, physical and biological integrity of the Nation's waters." Total maximum daily loads (TMDLs) are being established for watersheds that do not meet this goal. The TMDL is the highest amount of a given pollutant that is permissible in that



body of water over a given period of time. TMDLs include both waste load allocation (WLA) for point sources and load allocations for nonpoint sources. EPA has recently proposed a final rule that will require states to develop TMDLs and implement plans for improving water quality within the next 10 years. Under the new rule, TMDL credits could be traded within a watershed. Atmospheric deposition resulting from anthropogenic emission sources and acid mine drainage (AMD) are considered nonpoint sources in TMDL development. There is particular concern about sulfur, nitrogen, and mercury deposition, and it is possible that further controls will be placed on electric utility emissions to address these concerns. AMD has been identified as the single most damaging nonpoint source in Appalachia.



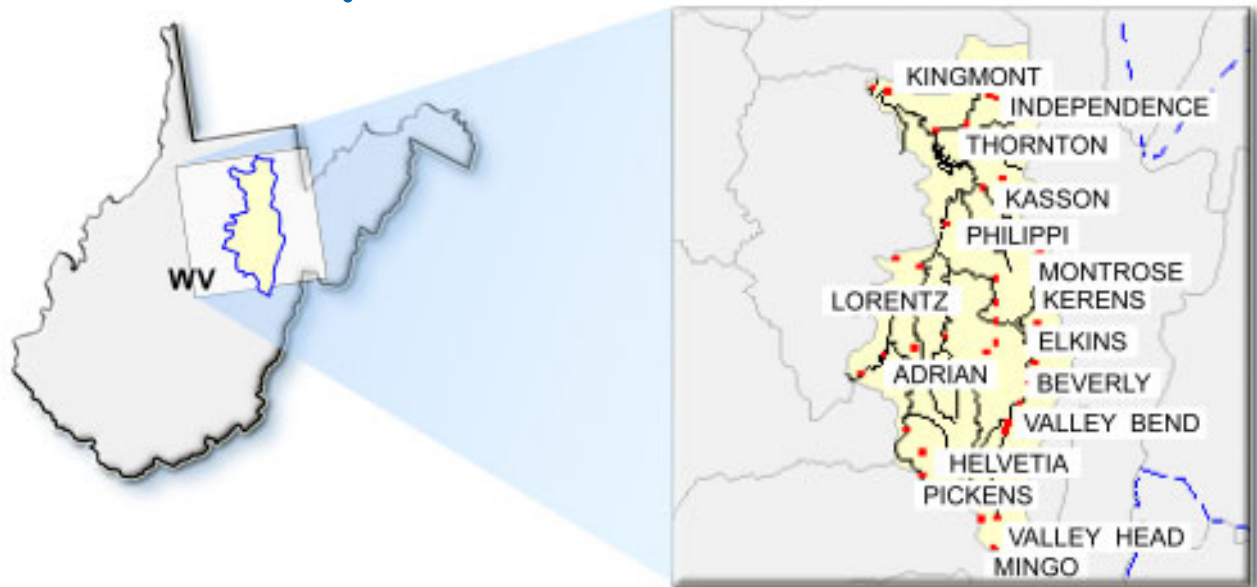
Water quality of watersheds throughout the Appalachian region that have been severely impacted by mining activities can be improved by reducing pollutants through land reclamation.

Carbon Storage

Over half of the electricity generated in the U.S. comes from coal-fired boilers, and coal is projected to continue providing at least half of the U.S. electricity supply through 2020. The continuing demand for fossil-fuel-based power and the associated rise in carbon dioxide (CO₂) concentrations will require that we find innovative ways to reduce carbon emissions through capture and storage. Vegetation and soils are natural carbon sinks. Although the amount of carbon that can be stored in our natural ecosystems is limited, it is estimated that an additional 50% of projected excess CO₂ emissions can be offset by enhancing natural storage. For example, reclamation and reforestation programs can be integrated with energy production by amending the soils with coal combustion byproducts, agricultural waste, and/or biosolids.

Trading Framework

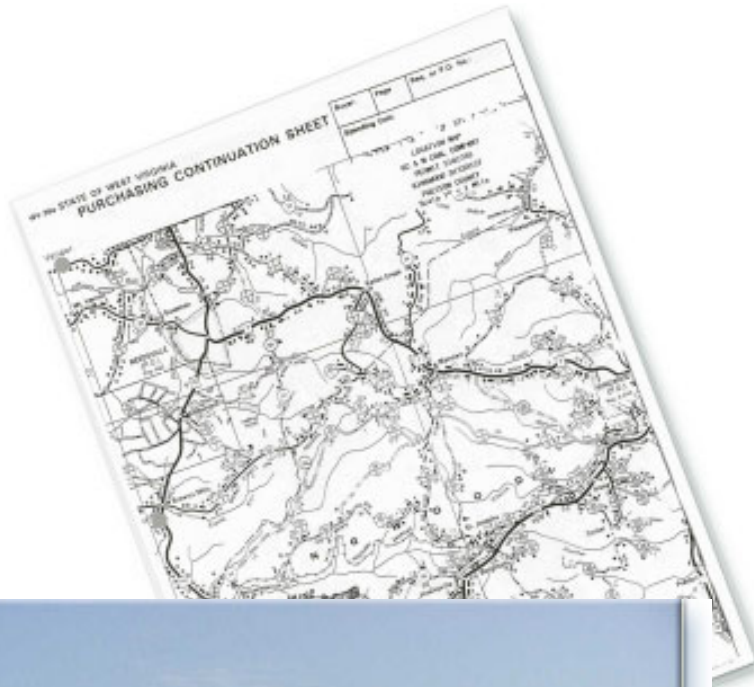
Trading systems have been proposed as methods for mitigating greenhouse gas emissions and improving water quality through effluent trading. Multi-pollutant-trading systems are often touted as “win-win-win” situations. Industries are allowed flexibility in finding innovative solutions, and when solutions are found there is potential profit from environmental credits. Trading systems result in an improved ecosystem health overall, and a multi-pollutant trading system (including TMDL and carbon credits) will be explored as part of this project.



Location of the Tygart Valley Watershed in West Virginia

Study Area

The proposed study site is a 35 acre abandoned surface mine site in Preston County, West Virginia. The surface mine was operated under a 1988 permit. For the past several years, the mining company has been working to have it released with no active mining. The area was rough-graded and seeded in 1995, but reclamation efforts were unsatisfactory and the bond was forfeited. The site lies in the Tygart watershed, which is listed as a high priority on the state's TMDL development list. Water quality onsite is poor, and shows visible signs of acid mine drainage. Information from the National Atmospheric Deposition programs/ National Trends Network depicting nitrogen (NO_3 and NH_4) deposition revealed very high estimates for the Tygart Valley area. The site is also near sources for coal combustion byproducts which can be used to amend the acidic soil.



Benefits of land reclamation not only include improved water quality but also reduced atmosphere pollutants such as carbon, which affect global climate change.

A HOLISTIC APPROACH TO ADDRESSING ENVIRONMENTAL ISSUES IN APPALACHIA

Project Benefits

- Quantify carbon sequestration associated with the use of coal combustion byproducts and AMD land reclamation
- Improve water quality in local watersheds
- Quantify water quality improvements associated with atmospheric deposition as a result of terrestrial sequestration at an abandoned mine site
- Improve overall ecosystem health
- Restore wildlife habitat
- Establish a framework for TMDL and carbon credit trading
- Enlist community involvement and cooperation among state, federal, local, and grass-roots organization
- Provide a model for large-scale improvements for similar sites in the future

Some of the benefits gained from land reclamation include restoring wildlife habitat

