Resilient Energy Economies

Waterway Restoration Helps Revitalize Mined Areas

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Background

Communities that lose key industries often seek to stabilize or revitalize their economies through financial incentives to attract new businesses or workers. But unaddressed legacy pollution signals that a place is neglected, which perpetuates further neglect, disinvestment, and decline. Remediating pollution left by legacy industries and restoring natural amenities could similarly incentivize new businesses and workers, making communities more attractive as a place to live, work, or invest. By replacing a signal of neglect with one of care and renewal, remediation may further the same goals as traditional economic development efforts, perhaps with less cost.

New research based on interviews and statistical analysis of coal mined areas in Pennsylvania explores how restoring waterways polluted by mine drainage reshapes the ways people view a community and its prospects. Together, we analyze how population grew (or contracted) from 1990 to 2020 across three types of communities (as identified in census tracts): those whose waterways remained impaired by mine drainage, those with some restoration of impaired waterways, and those without any initial mine-related impairment.

Key Findings

Waterways polluted with abandoned mine drainage signal and perpetuate neglect of surrounding communities. According to one study participant, nearby residents think, “What does it matter. It’s not like [the river] is clean to start. The water is orange. Who cares?” In contrast, remediation of mine drainage and restoration of waterways provide evidence of care and renewal. Following remediation and improved waterway aesthetics, aquatic life, and recreation, residents described shifts in community behavior and identity. They emphasized how remediated waterways fostered pride and optimism. One county official explained, “It’s an asset, it’s something that folks enjoy…the rivers are very much a part of the identity of this area.”

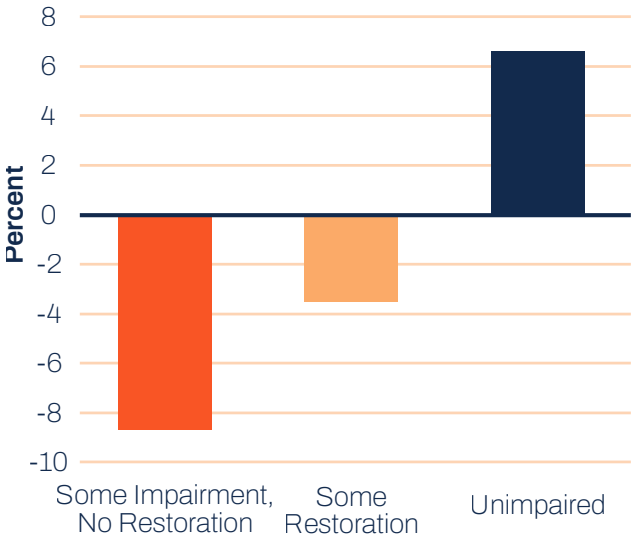
Statistical analysis available here confirms study participants’ beliefs that waterway restoration broadly benefits surrounding communities. From 1990 to 2020, Pennsylvania communities with waterways that remained impaired by mine drainage lost almost 9 percent of their population on average. In contrast, those with some restoration limited the loss to 3.5 percent, while nearby communities that began with no mine-impaired waterways grew by almost 7

percent (Figure 1). More rigorous statistical analysis that accounts for any differences in initial conditions (e.g., unemployment rate, mining employment, income, education, population density) shows a similar pattern: communities with some restoration had 6 percentage points more population growth than similar communities whose waterways remained impaired.

Comparisons with other public interventions highlight the attractiveness of investments in remediation and restoration as part of a revitalization strategy. The remediation work we studied cost about $240 per resident. By comparison, we estimate that popular investments in public multi-purpose trails (e.g., biking, walking) had a roughly similar effect on population growth with a similar cost ($200 per resident for two miles of trail) (Table 1). In terms of population, both outdoor amenity investments appear more cost effective than the federal Empowerment Zone program, which provides a useful comparison as it represents a traditional economic development program of tax credits and grants and has been rigorously studied. A prominent study of the program found weak evidence that it increased population growth while costing $1,500 per zone resident. The same study found a larger increase in jobs located in Zones, which suggests that traditional tax incentives can cause businesses to shift jobs to a community while not necessarily making it a more attractive place to live. More generally, a review of government-provided business incentives concludes that they are costly and often fail to benefit the targeted distressed communities.

Additional analysis shows that restoration can further strengthen communities because of who it retains or attracts. In terms of education, restoration most increases the population of college-educated residents, with growth increasing by 10 percentage points, and

Figure 1. Population Growth by Waterway Status, 1990–2020



Note: Mean population growth across Pennsylvania census tracts, 1990-2020.

Source: Weber et al. (2026).

Table 1. Population Growth Effects and Cost of Select Public Investments

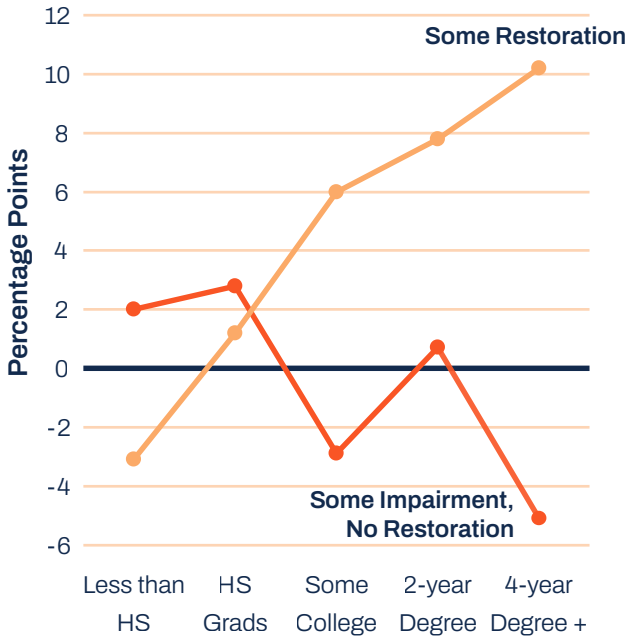
Investment	Population Effect	Cost Per Resident
Waterway Restoration	6%	$240
Public Multi-Use Trail	4%	$200
Empowerment Zone Incentives	6%	$1,500

Note: Population growth effects measured in percentage points over 1990–2020. Waterway restoration cost reflects 25-year treatment costs per tract resident. Trail costs are for two miles of trail.

Source: Weber et al. (2026); Black and Weber (2024); Busso, Gregory, and Kline (2013).

impairment most reduces their growth (Figure 2). In terms of age, restoration most increased the population of those 65 and older, followed by those ages 18-24. The greater senior population might reflect higher-income retirees seeking places with a high quality of life and low cost of living. A larger college-educated and retiree population can help communities sustain population thresholds needed to support key institutions, such as schools, hospitals, and stores. An expanding college-educated workforce also raises business productivity and generates wage gains that extend to less educated residents, making communities more prosperous and resilient.

Figure 2. Population Growth Effects by Education Level



Note: Effects on census tract population growth rates, 1990–2020.

Source: Weber et al. (2026).

Policy Implications

Pursue environmental restoration as an economic development strategy. Restoring natural amenities helps places retain and attract people, just as traditional economic development tax and wage incentives do. As a result, economic development entities at all levels of government should lend their expertise to advance remediation and restoration efforts, raise the visibility of their successes, and promote complementary investments such as public access infrastructure. This could look like assisting with writing grants and coordinating stakeholders in remediation projects. For example, entities like the Pennsylvania Department of Community and Economic Development and their county counterparts could help local governments and grassroots organizations secure funding, forge partnerships, and navigate compliance requirements. Extending assistance to grassroots remediation efforts can complement the technical expertise provided by state environmental agencies and help overcome the large stakeholder coordination costs that remediation projects can involve.

Reduce bureaucratic hurdles to funding grassroots remediation efforts. Although economic development entities can help grassroots watershed organizations overcome existing hurdles, government funders of remediation can reduce the height of the hurdles themselves. Federal programs such as the Abandoned Mine Land Fund and Clean Water Act grants as well as state programs like Pennsylvania's Growing Greener provide grants for remediation work, but for many grassroots organizations, which rely heavily on volunteers, the demands to navigate long and complicated grant application processes can

stymie worthwhile projects. As one participant described, “Most of the organizations will start up and then they’ll go away within five years because there’s so much red tape (and) paperwork that people just lose interest.” If agencies can provide and follow clear, consistent, and reasonable timelines for reviews and disbursements, they can enable a given amount of remediation effort to accomplish more.

Sustain public investments in remediation. Pennsylvania’s total abandoned mine liabilities reach at least $5.4 billion, but federal funds available to the state through the Bipartisan Infrastructure Law and Abandoned Mine Land Fund amount to only $2.5 billion. Proposed legislation that diverts Bipartisan Infrastructure Law funding from mine remediation (House Bill 6938) would reduce already insufficient funding for work that creates benefits well beyond clean water. Conversely, creating a federal Ohio River Basin Restoration Program, proposed Senate Bill 3796, would unlock resources to address waterway degradation from mining and other legacy industries of the region.

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About the Resilient Energy Economies Initiative

The REE Initiative was established in 2024 to develop strategies that support the economies of fossil fuel–dependent communities across the United States as the energy system transforms. In addition to supporting action-oriented research to find what works, REE has built a community of scholars, policymakers, and economic development practitioners from the local, state, tribal, and federal levels to share knowledge and build relationships across the nation’s energy communities.

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