WATERSHED-SCALE RESTORATION

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Overview

- "Watershed-Scale Restoration" Approach
- Case Study: Muddy Creek Watershed
- Current Efforts



"Watershed-Scale Restoration" Approach

The Clean Water Act (CWA)

Title 1 – Research and Related Programs Section 101 (33 U.S.C. 1251) Declaration of Goals and Policy

"Restore and maintain the chemical, physical, and biological integrity of the Nation's waters"

Actively managed discharges require a Sec 402 (NPDES) permit



Impediments to restoring watersheds

Jurisdictional

- Pre-Law vs Post-Law (SMCRA, 1977)
- AML (pre-law, Title 4)
- SR (post-law, Title 5)
- Active operations
- Which sites are prioritized?
- Who pays for restoration?

Regulatory

- Permitting approach
- Existing structure: NPDES (point source; accounts for active and SR but not AML)
- Alternative structure: TMDL (watershed)
- Water Quality Variance (in-stream)
- What is best for the watershed?
- Can we justify alternative approaches?



Short-falls of "point source" approach





Evaluating the "TMDL" approach



Solution: "Watershed-Scale Restoration"

Use centralized treatment & evaluate restoration based on TMDL





Case Study: Muddy Creek Watershed

Before watershed approach

- Regulatory Structure
 - Point discharges (SR, active operations) (Title 5, NPDES) vs,
 - AML discharges (Title 4, not regulated)
- Impairments
 - Muddy Ck responsible for ~50% of acid load to Cheat River
 - Three tributaries severely polluted: Fickey Run, Martin Ck, Glade Run
- Initial restoration plan
 - Multiple AMD treatment units on SR sites
 - Expensive w/ no stream restoration



Treatment Strategy: address all pollutant loads in Muddy Ck



Regulated discharges in **BLUE**; AML loads in **RED**



T&T AMD Treatment Plant

- Many point sources and SR AMD treatment units replaced by centralized treatment plant
- Consolidated deep mine AMD
- EPA granted in-stream NPDES permit variance



Financial Outcomes

Comparing Watershed to Point Source

- Higher CapX: water transfer, central facility
- Lower OpX: road maintenance, compliance monitoring, QC, supplies
- Contribution from Southwestern Energy (SWE)
- Documented costs/benefits
 attractive to external sponsors

Long-Term Costs (10-yr basis)

- Point source: \$22.5 M
- Watershed: \$21.2 M
- Watershed (w/ SWE contribution): \$15.2 M



Restoration Outcomes

<u>Metals</u>

- Reductions in major metals
 - AI: 83%
 - Fe: 88%
 - Mn: 58%



<u>pH</u>

- Increase in pH at mouth
 - 3.5-5 pre-treatment
 - 7-7.5 post-treatment

Benthic Macroinvertibrates

• 99% increase in WVSCI score at mouth



Source: WVDEP Watershed Assessment Branch, Biological Status Report, May 2021

Restoration Outcomes

Confluence of Muddy Ck and Cheat River before and after completion of T&T plant



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Current Efforts

Watershed-Scale AMD treatment and restoration

- <u>Agency</u>: WVDEP AML
- <u>Funding</u>: BIL funding for capital investments AND long-term O&M
- Objective: Construct watershed-scale AMD treatment plants
 - Characterize and prioritize watersheds
 - Collaboration with WVDEP, OSM, WVGES, watershed groups





Characterizing watersheds

- Comprehensive watershed sampling
- Involve watershed groups





Estimating Cost



Evaluating Watersheds



Questions?

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