Northern Shenandoah Valley, VA

HIGHLIGHTS

Location: Virginia

Jurisdiction Type: Regional Commission

Population: 222,152 (2010)

MS4 Permit: Varies by Jurisdiction

Project Period: 2013-2014

Funders: National Fish and Wildlife Foundation, Virginia DCR

Background

The Northern Shenandoah Valley is a five-county region, comprising Frederick, Shenandoah, Warren, Clarke and Page Counties, with a total population of approximately 220,000. While much of the region is agricultural in nature, its municipalities face concerns of stormwater finance. With support from the National Fish and Wildlife Foundation, the Environmental Finance Center (EFC) at the University of Maryland examined the potential economic impact associated with stormwater best management practices (BMPs) for communities in the Northern Shenandoah Valley.

The goal of the project was to provide data and analysis to enable Northern Shenandoah Valley localities to make evidence-based decisions on where and how to invest limited stormwater resources. At the time of the study, compliance with the Chesapeake Bay TMDL had followed a county and/or state level approach. The presence and role of the Northern Shenandoah Valley Regional Commission (NSVRC or "the Commission") provided potential opportunities for a regional approach to implementation of stormwater management and other BMPs addressing water quality. This project used economic modeling to gain insight on how and where stormwater investments may generate greater benefits when implemented under a more coordinated, regional approach.

Approach

In order to answer the questions of whether a regional model can afford greater efficiencies and benefits, this study brought together information on the types, scale, and costs of stormwater BMPs identified by each county in the region as its contribution to reducing nutrient loads that help the State meet Chesapeake Bay TMDL requirements, as well as the economic impact of stormwater spending specific to each stage of a stormwater BMP's implementation.

Using this information, the EFC examined how the scale of resources (i.e. labor) required to support the necessary operation and maintenance of stormwater BMPs may indicate where BMPs could be at risk of not being adequately maintained and, as a result, may not perform as intended, and the extent to which regionalization of these activities may provide sufficient scale to generate gains in efficiency and effectiveness.

The EFC's analysis specifically examined four key stormwater BMPs: 1) bioretention basins and rain gardens, 2) street sweeping, 3) urban tree planting and/or urban tree canopy, and 4) wet ponds or wetlands. Across the NSVRC counties, projected total implementation costs for these BMPs ranged between $13.8 and $42.8 million to treat anywhere between 1,060 and 3,315 acres. Among the four

BMPs, wetlands and wet ponds represented around 70% of the treated acres in each county, and bioretention and rain gardens accounted for 20% of the treated acres. Street sweeping and urban planting accounted for around 9% and 1% of treated acres, respectively.

For each urban stormwater BMP type, the project team divided cost into those pertaining to capital costs and operations and maintenance (O & M) costs. Understanding the split between these two categories is important because they impact a county's budget differently. Capital costs, which include design and construction costs, are generally up-front, one-time costs. In contrast, O & M expenditures represent on-going expenses typically extending into the medium to long-term.

The scenic Shenandoah Valley (Photo courtesy NSVRC)

To better estimate the on-going staffing requirements of stormwater BMPs, the project team used an economic model called IMPLAN. IMPLAN is an input-output model that tracks how a given expenditure ripples through the economy as measured by productivity, labor demand, and spending (by businesses, government and households). IMPLAN also produces staffing estimates. Applying the model in this case provided a better understanding of how direct O & M expenditures related to full-time equivalent (FTE) staffing needs.

Key Findings

The project team found that the greatest opportunities to find efficiencies and reduce costs were in the realm of operations and maintenance, and presented the following findings to the Commission:

- **The relative share of capital to O & M expenses varies among the BMPs.** For example, capital expenses represent nearly 70% of total expenses for bioretention. In contrast, capital expenditures represent only 20% of urban tree planting's total costs. For street sweeping and wet ponds, the relative share of capital costs is less disproportionate to O & M expenditures. In addition, the ratio of capital to O & M expenditures for a BMP does not correlate with a BMP's life expectancy. For example, tree planting has a 75-year life expectancy, with O & M costs representing 80% of the project's total costs. Street sweeping, which has the shortest life expectancy (20 years) also has O & M costs that account for nearly 60% of total project costs.
- **O & M activity plays a critical role in the long term efficacy and effectiveness of these capital investments.** Given its importance, the project team focused on O & M activity as an avenue for potential efficiencies and benefits of regionalization. The O & M component to any one of the BMPs requires implementation of anywhere between 500 and 2000 treated acres in order to support a single FTE. Regardless of the varying levels of BMP activity across the counties, the total FTE requirement within each jurisdiction is small. All counties face challenges of having

sufficient scale to warrant at least one FTE on a regular basis for many of the BMPs. At the same time, the necessary O & M activity is too important for a jurisdiction to simply overlook.

- At present, counties address O & M needs on an ad hoc basis by assigning these activities to the workloads of existing staff. **This approach results in costly inefficiencies from a resourcing and effectiveness perspective.** Examples of possible causes of the inefficiencies include that O & M activities may be at risk of not happening with regular frequency or in a timely manner, or responsibilities being assigned to various staff resulting in disjointed knowledge and familiarity with the history of a BMP. However, under a regional approach, aggregating the O & M responsibilities and the accompanied resources would generate an economy of scale that could lead to dedicated staff providing continuity and consistency in O & M of BMPs. In turn, benefits could arise from:
  - greater effectiveness and efficacy through skilled, trained staff familiar with history and performance of BMPs;
  - cross fertilization of knowledge through dedicated staff servicing BMPs across the region rather than each county facing the learning curve separately; and
  - cost savings in procurement through design and managing a more regular O & M program.

Conclusions

IMPLAN results suggested that **a regional approach to stormwater BMP implementation could benefit Northern Shenandoah Valley localities.** This analysis provided a simple approach to identifying and illustrating which BMPs are viable candidates for regionalization.

A regional model offers an approach to strategically pooling resources particularly as it applies to BMP operation and maintenance that can improve the efficiency and effectiveness without necessarily changing each jurisdiction's resource commitments if it were to act independently. In other words, this approach would allow the FTE requirements of the BMPs to be aggregated across the jurisdictions, thereby justifying the need for dedicated personnel while simultaneously not increasing a BMP's FTE cost requirement. As noted, efficiency and efficacy gains are likely to be realized through: (1) greater knowledge share; (2) lower "learning" costs; and (3) more holistic and consistent approach to a given BMP's implementation.

Fully applying this approach to develop a regional model for BMP implementation will require additional efforts, including a more detailed assessment of opportunities. This would likely need to include an inventory of existing resources including both capital assets and labor skills held by each jurisdiction that could be used regionally, an evaluation of the logistical and technical feasibility of pooling candidate resources, identification of appropriate cost share arrangements for regionalized activities, and construction of a transparent system for prioritizing and funding regional activities.

For more information, please visit the MOST Knowledge Center.

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