Schuylkill Action Network
Financing Strategy

A White Paper Report
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Introduction

This report was produced by the Environmental Finance Center (EFC), which is located at the National Center for Smart Growth Research and Education at the University of Maryland, College Park. EFC's work on this project was partially supported by a contract from the Partnership for the Delaware Estuary on behalf of the Schuylkill Action Network (the Network). The purpose of this report is to outline the funding and financing challenges related to restoring and protecting water resources in the Schuylkill watershed, and to provide recommendations to the Network for supporting key financing needs throughout the region. Our analysis focused on the Network's four "areas of concern" – abandoned mine drainage, agriculture, wastewater, and stormwater – highlighted in the Schuylkill River source water assessment.[1]

Our strategy with this project was to analyze each of these areas of concern in a way that provides state leaders with an understanding of current regional capacity to finance water restoration and protection initiatives. Financing large-scale efforts such as restoring and protecting the Schuylkill River watershed requires the interaction of government with private industry and the financial markets. It requires the application of financial analysis to key government activities such as public debt financing, capital investment, economic development, regulation of private industry and enterprise, and the creation of efficient financial incentives to further restoration programs and policies. Developing a comprehensive financing strategy will be the first step in accomplishing these goals.

The first section of the report highlights many of the key issues facing the Network and community leaders as they work to mitigate the threats to water resources in the region. The second section outlines the framework or structure of our analysis in the four areas of concern, including a description of key financing issues and the components of sustainable financing strategies. Sections three through six provide analysis of the four areas of concern based on the analysis structure. Included is a discussion of many of the most critical financing barriers and challenges, as well as recommendations to the Network as it moves forward in its efforts to impact each of these areas. Finally, we provide a list of recommendations to the Network, and the community, to strengthen the region's capacity to implement and finance water resource protection efforts.

[1] The Network considers pathogens to be one of the four areas of concern. However, the project team focused exclusively on wastewater management. Our reasons for making this change were twofold. First, though pathogens are introduced to the watershed in a variety of ways, including stormwater and agricultural runoff, these issues are addressed in other areas of the report. In addition, the other three areas of concern focus on the sources of pollution, whereas pathogens are the pollutant. For consistency, we focused on the primary source of the pollution – wastewater.

Key Issues

Today, leaders throughout the Schuylkill River watershed are at a critical point in their efforts to protect and restore water resources throughout the region. Significant time and resources have been committed to studying threats to the river and its watershed and to the development of a water resources restoration and protection strategy. By detailing the physical changes on the land necessary for protecting and restoring the watershed, the source water assessment identified and articulated clear threats to the region's water resources and the best management practices and activities necessary for effective protection and restoration. The next step is to develop a comprehensive strategy for implementing best management practices as well as a process for improving the effectiveness of community investments used to implement watershed priorities.

Though the details of a comprehensive financing strategy have yet to be defined, it is certain that the costs associated with mitigating threats in the areas of abandoned mine drainage, agriculture, wastewater, and stormwater will be extensive, thereby creating a significant implementation barrier. Overcoming this barrier will require local, state, and federal leaders to look beyond traditional funding programs and tools and to develop effective, sustainable financing strategies. These financing strategies must focus on leveraging sustainable, sufficient revenue sources; building effective, efficient financing institutions; and developing innovative financing instruments that reduce implementation costs and provide the opportunity to improve the effectiveness of each jurisdiction's water related programs.

Financing is predicated on two key activities: identifying and leveraging sustainable, dedicated revenue streams, and expending fiscal resources in a manner that improves program efficiency and the return on investment. By understanding the relationship between these financing components, as well as the tools, programs, and best management practices that impact them, leaders throughout the region will develop more effective watershed programs. These programs, in turn, will greatly improve implementation success while reducing overall costs.

Perhaps no issues are more controversial or politically charged than those associated with paying for and financing large-scale programs like watershed protection and restoration. Developing a successful, sustainable financing effort in the Schuylkill River watershed will require leaders throughout the region to overcome significant barriers and conflicts. Therefore, the project team has identified a number of key issues that we feel must be addressed in order for a financing and implementation effort to be successful.

Funding the Network vs. financing restoration efforts. Our strategy with this report was to make clear the distinctions between the funding needs of the Network with the financing needs associated with protecting water resources. Much of the Network's effort to this point has focused on identifying funding sources for specific projects and activities centered on the four areas of concern. Securing funding and applying it to critical, high profile demonstration projects is a very effective way to seed a program. In fact, this is the most logical first step in many financing efforts and can be used to expand protection and restoration efforts with great effectiveness. However, the ultimate goal of the Network is to protect water resources throughout the Schuylkill River watershed, with a specific focus on protecting drinking water supplies. This will require moving beyond leveraging funding programs to developing a comprehensive financing strategy. This report provides a foundation or structure for developing this strategy and identifies opportunities and barriers to achieving long-term success.

The need for leadership. One of the strengths of the Network is that it is represented by stakeholders and communities from across the watershed, all with the common goal of protecting water resources. Much of the leadership to this point has been provided by the Philadelphia Water Department and the Partnership for the Delaware Estuary – two key organizations in the restoration effort. However, as the Network moves from voluntary implementation projects to more codified financing and regulatory efforts, it must engage leadership at the highest levels. As we discuss throughout this report, successful financing will require very aggressive, difficult decisions from many leaders across the region, and in fact, will ultimately require the commitment and participation of all levels of government. As key financing and funding ideas are developed and debated, the Network should immediately engage the Governor's office and staff, the state general assembly, and other key officials.

Citizens and the community must fund this effort. Though leadership is critical, it is the constituents of leaders across the region that will be responsible for supporting the restoration effort. There are real costs associated with restoring water resources in the Schuylkill watershed, and successfully protecting and restoring the Schuylkill River will require a broad array of policy and financing instruments implemented across the watershed. It will be the citizens, ratepayers, businesses, and communities within the watershed that will be responsible for paying these costs. The focus of the Network should be to work with community officials on developing innovative tools and resources that create efficiencies, reduce costs, and increase the value associated with the community investment.

A balanced approach will be critical. Both watershed protection and source water protection efforts require community leaders to balance the responsibility of those who pollute to compensate for their actions, and the responsibility of those who benefit to pay for the associated benefit. This is the classic friction between upstream and downstream communities. Much of the focus of the Schuylkill River source water assessment focused on the need to effectively enforce environmental laws and financing programs related to the four areas of concern. However, it is critical that local leaders understand the associated benefits of source water protection and the financing responsibility of those downstream. For an aggressive restoration and protection strategy to be effective, it must be equitable. This will require balancing the responsibilities and needs of dischargers with those of extractors.

Clear restoration goals and strategies must be established. Though the Network and its many participating organizations have focused on gauging the threats to the Schuylkill River, there is no plainly documented, multi-stakeholder generated restoration goal or strategy. As we reinforce throughout this report, there are costs associated with protecting and restoring the watershed. However, no definitive metric for gauging the return on the public's investment has been identified, and it is unclear how success will be measured. Nor is there any clear agreement on the role and responsibilities of watershed communities, the state, the federal government, municipalities, and counties in the restoration and implementation process. This creates a significant barrier in the financing process. A critical next step for the Network in this process will be to work with communities to develop the appropriate goals, objectives, and associated strategies.

Analysis Structure for the Four Areas of Concern

The objective of any financing effort is to accomplish a specific goal in the most efficient way possible, thereby increasing return on investment. The financing process itself is universal. It applies to micro level applications, such as the implementation of specific projects, as well as macro level efforts, such as financing the restoration and protection of the of the Schuylkill River watershed. Regardless of the scope of the financing effort, there are core components of the financing process that are critical to the Network's long-term goals and strategies. Our goal was to analyze each of these financing components and to provide Network members and local leaders with a tool for determining how best to expend limited fiscal resources among myriad best management practices and watershed priorities. To that end, we analyzed each of the four areas of concern based on the following issues and criteria.

Identifying financing sources

It could be argued that the most critical issue facing watershed restoration efforts across the region and the country is the need to leverage sufficient, sustainable revenues necessary to implement and maintain critical programs. Money alone does not ensure success, but without sufficient revenue streams, implementation of many of the most critical best management practices will not occur. A revenue or financing source is the ultimate payer of a cost associated with any activity being paid for or financed. The Network has begun the process of identifying the costs associated with protecting water resources throughout the watershed, and these costs require some type of corresponding dedicated, sustainable revenue source. Watershed organizations and community leaders are always looking for new sources to fund restoration activities. It is important to remember, however, that the ultimate revenue source for ensuring the protection of water resources throughout the region will always be the citizens of the region.

The process of leveraging sustainable, dedicated revenue or financing sources is critical in the restoration process. Much of the innovation related to implementing the water resource protection efforts in the years to come will not be represented in the form of new technologies and best management practices. Rather, innovation will be associated with the political will necessary to leverage revenue resources from the citizens, taxpayers, consumers, and businesses within the community. For example, the state of Maryland recently enacted the Chesapeake Bay Restoration Fund, a surcharge program (the flush fee/tax) considered by many to be one of the most innovative, progressive environmental laws to be passed in the last twenty years. The strength of this program results from the financing process – leveraging dedicated revenue streams through debt financing. However, what made this program so innovative was the ability of the state elected officials to exercise the political will necessary to extract the revenue from the financing resource – the citizens of the state. That was truly innovative.

The correlations to the Schuylkill Action Network are important. There are a number of reasons why the surcharge legislation was successfully passed, but a critical reason was the fact that it met with very little resistance on the part of the citizens of the state of Maryland. There are many reasons for this, but one significant reason is that the citizens have been educated for years on the importance of restoring and protecting the Chesapeake Bay. Therefore, they knew that public resources, to some extent, would be necessary to accomplish restoration goals. Elected officials and local leaders make decisions based on the needs and desires of their constituents, and this requires the constituents to understand critical issues. The Schuylkill Action Network has an opportunity to fill this financing role by education the citizens on the need for protecting

water resources and the value of investing limited public resources on water programs. This is a critical financing role that is often not effectively filled in many communities.

Though the citizens of the region will ultimately be the source of payment for the costs associated with protecting and restoring water resources within the Schuylkill River watershed, the most appropriate and politically acceptable tools for extracting payment have yet to be sufficiently identified and debated in local communities. Obviously, the goal is to leverage as many sustainable sources as possible, and the most sustainable financing sources are the most direct sources, i.e., the citizens and businesses located within the watershed. The EFC project team focused its analysis and research on identifying opportunities for leveraging funding efforts, thereby ensuring sustainable, dedicated, sufficient funding resources. Key issues addressed include:

- Identifying the types of additional revenue sources necessary for implementing water resource protection programs, and the political barriers and opportunities associated with developing and leveraging those sources.
- Defining the appropriate role for state and local governments in the financing process.
- Providing strategies for communities to use federal funding and financing programs more effectively.
- Identifying the types of innovative private sector models that can be implemented to acquire, invest, and manage fiscal resources.

Developing and building institutions

A critical point in the financing process is when community leaders address their institutional capacity necessary for effective watershed protection and restoration. The goal of financing institutions is to allocate resources and transfer value through structural financial transactions and markets. It is the responsibility of financing institutions to implement the financing process of acquiring, investing, and managing fiscal resources. This process is clearly defined in many areas, such as financing capital infrastructure needs related to wastewater management. However, the institutional needs and requirements are more complicated in other areas, such as financing the implementation of best management practices related to unregulated nonpoint source pollution.

Financing institutions connect program costs to revenue resources. In the private sector, these institutions develop as a result of market forces or market activity and are driven by the laws of supply and demand. In public sector, financing institutions are created to manage the financing process as a result of various compulsory activities or to accomplish a critical community service. The source of the revenue is no different in either scenario – it is the citizens of the community. And, the function of the institutions is no different – it is to facilitate the allocation of revenue sources.

As the Network develops its financing strategy, it needs to understand the capacity of the communities throughout the watershed to implement critical programs and activities. The issue of capacity is a critical one, and it encompasses a number of community issues including fiscal capacity, political capacity, and institutional capacity. What this means is that money alone will not protect water resources within the Schuylkill River watershed. It will require significant political engagement at all levels as well as the necessary institutional arrangements to successfully implement and finance critical water protection programs.

Gauging the scale of the problem
Obviously it is very difficult to pay for and finance anything without an understanding of its cost. In each of the four areas of concern, we provide a general idea of the scale of the problem, and the level of resources that will be necessary to achieve restoration and protection goals.

Recommendations for moving forward: Filling the financing gap
The difference between implementation costs and financing capacity is the financing gap. Filling this gap through effective, innovative financing tools and instruments is at the core of developing a financing strategy. Financing instruments are the tools that are necessary to connect the financing source or revenue to the cost of a program, or project, or desired community outcome. Financing instruments take a variety of forms such as debt through bonds or revolving loan programs, or market-based tools such as development rights programs, or pay as you go tools such as agricultural cost share programs. Though there are many variations and types of instruments available to communities, the goal of each is the same: to implement a program or project in the most efficient way possible, thereby increasing the community's return on investment. This is the investing part of the financing process.

The EFC project team has provided a description of potential funding and financing tools and their applicability throughout the Schuylkill River watershed. The team based its analysis and recommendations for financing instruments on the type of financing sources and institutions necessary for effective implementation of watershed priorities. Areas of focus included:

- *Opportunities for leveraging federal and state funding and technical assistance programs.* Though grants will never be sufficient to fund all water resources protection and restoration needs, public funding and technical assistance programs can be a very effective way to seed watershed programs. Each of the four areas of concern has a variety of state, federal, and in some cases local programs that have been developed to help fund environmental efforts. The project team analyzed many of these opportunities within each area and made recommendations for taking next steps.
- *The appropriate role and use of taxes and fees.* Taxes and fees are the basis for most public sector financing projects across the country, and are the primary instrument for managing most point source program needs. The team identified where there are opportunities for leveraging general fund programs and the criteria that should be used to determine which type of revenue instrument is most appropriate. This analysis was especially important related to stormwater and wastewater management.
- *The use of effective regulation and land use restrictions.* One of the most effective ways to finance watershed programs is to reduce the costs associated with implementation. Effective zoning, development standards, and land use restrictions can reduce implementation costs by preventing impact in the first place. Our goal was to identify opportunities for improving or strengthening local regulations and their potential impact on watershed financing efforts.
- *Market-based tools.* Market-based programs provide one of the most significant opportunities for financing extensive watershed protection efforts. Like regulatory programs, markets provide an opportunity for communities to reduce the cost of implementation by leveraging competitive behavior. Market-based tools and programs have been implemented in communities all across the country. EFC identified a variety of market-based opportunities for reducing program costs within the Schuylkill watershed.

Abandoned Mine Drainage (AMD)

Coal mining in Pennsylvania has been a critical component of the state's economic base for more than 200 years. Along with the significant economic benefit, however, has been a legacy of pollution and environmental degradation that has created one of the most difficult and intractable environmental financing issues in the country. The 15 billion tons of coal removed from state mines over the past 200 years has left behind more than 250,000 acres of abandoned mine lands,[2] which create numerous environmental and public safety concerns for communities throughout the state. Drainage from abandoned mines often discharges water containing heavy metals, sulfates and acid into many Pennsylvania watersheds. About 2,400 miles of streams have difficulty supporting aquatic life and many drinking water supplies do not meet current water quality standards.[3] An estimated $15 billion is needed to eliminate all know environmental and safety problems associated with abandoned coals mines.[4]

Abandoned mines have been characterized as a major pollutant source in the Schuylkill River watershed, specifically in the upper part of the watershed. Due to the impacts of AMD, the Pennsylvania Department of Environmental Protection (DEP) has listed the Upper Schuylkill River and many of its tributaries on the 303(d) List of Impaired Streams.[5] The impact of AMD in the Upper Schuylkill watershed has been extensively documented. As the Upper Schuylkill River TMDL Watershed Implementation Plan document indicates, there have been a number of watershed assessments, studies, and reports conducted in the watershed over the past six or seven years. These studies have indicated that there are as many as 100 AMD discharge/recharge sites in the watershed.

One advantage associated with AMD is that it is a legacy issue that does not perpetuate itself. Mining activity will always have an environmental impact, but Pennsylvania has led the way in developing programs that ensure that abandon mines from new mining activities are mitigated appropriately. This means that money invested appropriately will solve the pollution problem permanently, making for an effective investment of resources.

Scale of the problem and its impact

AMD issues in the Schuylkill watershed are relatively small compared to other regions in the state. Cost estimates for remediation of the problem are between $20 and $50 million. Approximately 60 – 70% of these costs are associated with a single discharge called Pine Knot.[6] Though the cost associated with mitigating AMD problems is relatively small, AMD has a significant ecological impact on the watershed. This creates a significant opportunity – a relatively small investment can have a significant impact on a large part of the state's population.

Revenue sources and the role of state and federal programs

The most appropriate source of financing for any environmental mitigation issue is the discharger or polluter. Sometimes, identifying a polluter or source of pollution can be difficult,

[2] Pennsylvania Department of Environmental Protection. "Reclaim PA: Pennsylvania's Abandoned Mine Reclamation & Well Plugging Program." November 1998. 6 December 2006. < www.dep.state.pa.us/dep/subject/pubs/mrm/mining/FS2284.doc>.

[3] Ibid.

[4] Ibid.

[5] *Upper Schuylkill River TMDL Watershed Implementation Plan*, May 2005. Prepared by the Schuylkill Conservation District, the Schuylkill Headwaters Association, Inc. and RETTEW Associates (May 2005) 3.

[6] Ibid. 39.

but in the case of AMD, it is relatively straightforward. The source of the problem was the many mining companies that operated in the region. Though all mining activities have an impact on the land and the environment, current mining operations are regulated with relative effectiveness and are not adding to the problem.[7] Due to the fact that former mining companies are no longer in the area or in business at all, there are real equity issues related to the obligation of current mining operators to fund the mitigation of past mine activities. In short, with the case of AMD, the most direct financing source provides a very insufficient, or inequitable, revenue stream.

As a result of the enactment of the Surface Mining and Reclamation Act of 1977, the federal Abandoned Mine Reclamation Trust Fund became the primary source of funding for Pennsylvania's AMD mitigation efforts. According to DEP, the state has received approximately $500 million from the fund to date, which has funded the completion of approximately 1,500 reclamation projects. Each year the state receives approximately $21 million from the trust fund, which finances about 100 reclamation projects per year. Though the state uses the money to target health and safety hazards, the federal government does require each state to set aside 10% of the funds for AMD mitigation issues. Though the money from this program has been used to implement innovative mitigation best management practices, such as passive treatment systems, the program is not capitalized enough to effectively mitigate AMD across the state. Leveraging additional revenue sources to supplement state and federal programs will be necessary to adequately mitigate AMD impacts in the watershed.

Gauging financing capacity: developing and building institutions

In many respects, Pennsylvania leads the nation in developing the institutions necessary for financing AMD problems. However, the legacy nature of AMD presents a very unique financing situation. As was mentioned in the first section of this report, financing institutions develop when there is either a market demand for financing services or there is some type of regulated activity that requires the investment and management of community fiscal resources. For example, with current mining practices, the state has mandated that mining operations mitigate the impacts of their activities through the use of a bonding assurance program. This program combines the financing institutional capacity of the state with the private market. The state manages the bonds while the mine operator incorporates the cost of mitigation into the price of the resource being produced. As a result, a very effective financing institutional arrangement has been developed. With abandoned mines, the problem is more complex. There is no existing mining operator to regulate; therefore, there is no chance for a private institutional arrangement to occur. As a result, the state must serve as the exclusive financing institution, and it must contend with the fact that there is no reliable revenue source.[8] This creates a significant breakdown on the institutional framework for dealing with the AMD issue.

[7] The federal Surface Mining Control and Reclamation Act of 1977 requires all active coal operators return the lands they mine back to its original contour. Mine operators are required to post bonds to guarantee work will be done within a specific amount of time.

[8] The source of financing for current mining operations is ultimately the consumers using the product. Coal is mined almost exclusively to produce energy. Therefore, the costs associated with environmental mitigation are incorporated into the cost of the product, which is ultimately passed on to energy consumers. This is an example of regulation leading the internalization of adverse impacts and costs, thereby leading to full cost pricing, which is the most fiscally efficient financing structure.

Recommendations for moving forward: filling the financing gap

The first step in financing AMD programs is to clarify the scale of the problem and the associated best management practices. According to members of the Network's AMD work group, there is not yet consensus on which best management practices – direct or passive treatment – will be most effective and efficient for mitigating the AMD problem in Pine Knot, the most significant AMD source in the watershed. It is also not clear that Pine Knot offers the most efficient use of limited fiscal resources at this time. It is possible that mitigating less expensive AMD sites would provide a greater return on investment. Clarifying and prioritizing mitigation of each of the most critical sites will be essential. A variety of passive and systems-based approaches to mitigating AMD discharges have been developed, each with their own unique advantages and opportunities. By clarifying the most appropriate best management practices for each project, as well as the associated costs, detailed financing strategies can be developed.

There have been a number of innovative programs developed within Pennsylvania, as well as across the country, to fund the mitigation of AMD sites. Bonding programs, set asides, fees in lieu, civil penalties, surety reclamation, and insurance fund programs have all been developed and implemented across the state.[9] In fact, the state has done a very effective job of filling the institutional gap and implementing some very innovative financing tools and instruments. Again, however, the problem is the lack of sustainable, dedicated, and sufficient revenue streams. In fact, the Schuylkill River watershed is in many ways may not be a priority for state revenue programs because the most pressing issues are not directly related to public safety and health. Without commitment from the state or some other funding source, existing funding programs will not be sufficient to solve the AMD problem within the region. The breakdown in fiscal capacity is not the result of a lack of innovative financing instruments or even institutions. Rather, it is the unique situation of "legacy" pollutants where the polluter is no longer part of the financing framework.

The appropriate role and use of taxes and fees

Abandoned mine drainage is unique situation that could be described as being a point source pollutant with the financing characteristics of a non-point pollution source. For the reasons described above, it will be very difficult, if not impossible, to extract payment from polluters. Therefore, it is very difficult to assess direct fees to mitigate AMD impacts.[10] It will require an indirect approach of assigning the responsibility for paying for AMD mitigation to those who benefit from solving the problem – i.e., the extractors. A recommendation for making this work is provided in the final section of this report.

The use of effective regulation

Mining provides a perfect example of how effective, enforced, and equitable regulations can reduce the costs associated with natural resource protection. It could be argued that Pennsylvania's approach to addressing the environmental impacts of mining activity in the state is a regulatory success story. The state has very effectively used a combination of economic incentives and disincentives, coupled with regulatory requirements, to ensure that the

[9] The Pennsylvania Department of Environmental Protection web site provides detailed information on each of these programs. For more information on each, visit: http://www.dep.state.pa.us/dep/deputate/polycomm/update/08-27-99/08279931.htm

[10] Bonding programs could be described as a type of fee-based system. Mining operators are required to purchase bonds to guarantee reclamation activity at mining sites.

environmental impact of existing and future mining activities is effectively mitigated. From a financing perspective this is important because it alleviates future mitigation costs. The same type of lesson can be learned in other impact areas, such as stormwater management, which is discussed later in this report. However, regulatory approaches do not provide many opportunities for financing existing abandoned mine drainage problems. Given that the pollution has already occurred and the polluters have abandoned the problem, additional regulation will have little if any impact.

Market-based programs and tools

Though the financing issues associated with the environmental impacts of abandoned mine drainage sites are complex and in many ways uncertain, what is clear is that neither the impacted communities nor the state will have the necessary fiscal resources to solve the problem completely. Success will require leveraging economic tools and market forces to allocate the necessary capital to effectively finance AMD mitigation efforts. A key role of financing institutions is to facilitate the interaction between government and private industry, and Pennsylvania has led the nation in facilitating this interaction in the mining industry.

One of the most promising market-based opportunities related to mitigating AMD impacts in the Schuylkill watershed is remining.[11] Remining is the surface mining of previously mined and abandoned surface and underground mines to obtain remaining coal reserves.[12] In addition to having severe environmental and safety problems, abandoned mine lands can contain significant quantities of coal. Modern surface mining techniques now provide mining operators with more economical means of "remining" to extract remaining coal reserves. During remining operations, many of the problems associated with abandoned mine lands are mitigated because the operator becomes responsible for reclaiming the abandoned land. Remining has the multiple benefits of improving water quality, removing hazardous conditions, and utilizing remaining coal as a resource instead of mining virgin land.[13] As a result, remining operations provide the opportunity to create jobs in the coal industry, produce coal from previously disturbed areas, and improve aesthetics by backfilling and re-vegetating areas according to current reclamation standards. Remining operations also reduce safety and environmental hazards by sealing existing portals and removing abandoned facilities, enhance land use quality, and decrease preexisting pollution discharges.[14]

Though remining provides a real opportunity to leverage market forces to accomplish critical community needs and priorities, it can be very difficult to provide enough incentives to mining companies to assume the risk of implementing remining projects. As with brownfields development programs, mining companies are faced with concerns of legal and economic

[11] Remining is also an example of how regulation and market-based tools can be effectively coupled. R-mining reduces the costs associated with mitigation because the new mine operator is required to install BMPs after mining operations are complete.

[12] Jeff Skousen, et al., "Remining In Pennsylvania and West Virginia: Costs and Water Quality Changes," Green Lands, Summer 1997. Available online from the West Virginia Extension Service Web Site: < http://www.wvu.edu/~agexten/landrec/remining.htm>

[13] United States, Environmental Protection Agency, "Amendments to Effluent Limitations Guidelines and New Source Performance Standards for the Coal Mining Point Source Category: Final Rule," EPA Office of Water, EPA 821-F-01-018, 2001, 17 Dec. 2006 < http://www.epa.gov/waterscience/guide/coal/fsdec2001.html>.

[14] Jeff Skousen, et al., "Remining In Pennsylvania and West Virginia: Costs and Water Quality Changes," Green Lands, Summer 1997.

liability and risk. To mitigate the risk, the state of Pennsylvania has led the nation in developing innovative economic tools that create incentives for mining companies to implement remining projects, while at the same time assuring sound environmental stewardship and mitigation. These types of market-based programs reduce the costs associated with protecting water resources in the region. Facilitating the implementation of these types of programs should be a critical focus on the Network and its partner organizations.

Next Steps and Recommendations

The efforts of the Network partners working on AMD issues have been one of the Network's real success stories to date. A coalition of state, local, non-profit, and private sector organizations have been working very effectively on AMD funding and financing issues in the upper part of the watershed. In addition to continuing to support the efforts of those organizations that are working on these issues, we recommend that the Network focus on the following priorities:

The Network should focus on developing clear implementation goals, strategies, and priorities related to all of the most critical AMD discharge sites. There are more than 100 discharge sites in the watershed with various levels of impact on the region's water resources. The most extensive problem sites have been documented in both the Upper Schuylkill TMDL study and the Networks' strategic plan. The next step is to prioritize restoration efforts with a focus on the mitigation costs and associated return on investment.

The Network should sponsor a study analyzing the most cost-effective AMD mitigation approaches and strategies. While the costs of reclaiming the most critical AMD sites in the watershed have been determined, there is still no clear consensus on the cost effectiveness associated with specific best management practices and implementation schedules. Though there is no single best management practice or solution to the AMD restoration needs, there may be opportunities for "passive" approaches to employed. In addition, it needs to be determined where market-based tools like remining are viable. Whether passive or systems-based approaches are most effective, a better understanding of the most effective practices on a project-by-project basis is essential. This is an essential financing need, and one that could be addressed very effectively by the Network.

Agriculture

The connection between agriculture and water resource protection creates a very complex environmental and natural resource protection dilemma. Like other regions across the country, agriculture and agricultural production are vital parts of the economy, landscape, culture, and heritage in the Schuylkill River watershed. Therefore, protecting agricultural lands and open space is a pressing local need. However, many types of agricultural activity and production continue to have an adverse impact on the environment, specifically water resources. There have been a number of studies, including the source water assessment and the Upper Schuylkill River TMDL report, that have identified a variety of threats to water resources resulting from agriculture activity. Though these threats have been well documented, in many ways the risk of agricultural lands being converted to development creates a far greater threat to water resources. As a result of these conflicting dynamics – the need to reduce pollution runoff from agricultural lands while at the same time protecting open space and agricultural lands from development – the region is faced with a significant watershed financing challenge.

Scale of the Problem

When considering the scale of the agricultural issue in the Schuylkill watershed, it is necessary to quantify both the costs associated with protecting agricultural lands and open space as well as the costs associated with reducing pollutant loads from agriculture.

Reducing pollutant loads. Again, there have been a number of studies detailing the scale of the pollution threat from agriculture in the watershed. What we know is that approximately 37% of the watershed's lands are agricultural and roughly 10% of the Schuylkill watershed's impaired waters are impaired by agricultural operations.[15] Therefore, implementing agricultural BMPs will be a critical priority for restoration efforts. According to the U.S. Environmental Protection Agency, sedimentation impacts 80 of the Schuylkill's 100 impaired waters, while nutrients affect 23.[16] Pathogen pollution, which is a significant threat to water resources in the region, has also been identified as a challenge, resulting from livestock in and near water. Costs associated with necessary best management practices will vary, given the broad range of options. Quantifying these costs will be difficult, because while the threat has been well documented, a strategy for mitigation has not.

Because there is no comprehensive strategy for reducing pollutant loads from agriculture, it is very difficult to quantify associated costs. The Network has developed a list of priority projects and best management practices. However, it is not clear how much of the pollution problem will be resolved as a result of these efforts. Accurately determining the scale of the problem and the associated costs will require specific pollution reduction goals and specific recommendations for implementing best management practices to achieve those goals.

Protecting agricultural lands and open space. In addition to best management practices, land preservation will play a critical role in long-term protection of the Schuylkill watershed. Land preservation is a key part of sustainable land use planning and will be especially important in the Schuylkill given both the importance of agriculture to the economy and culture of the region, as

[15] "Report on the State of the Schuylkill River Watershed," Sec. 3, Dec. 2002 < http://www.schuylkillreport.org/>.

[16] [16] United States, Environmental Protection Agency, " Economic Analyses of Nutrient and Sediment Reduction Actions to Restore Chesapeake Bay Water Quality," EPA Region III Chesapeake Bay Program Office, Sep. 2003, 5 Dec 2006 <http://cims.chesapeakebay.net/ecoanalyses.htm>.

well as the potential threat of land conversion on the region's water resources. According to the State of the Schuylkill Report in 2002, if current population trends in the region continue, upwards of 130,000 acres of land could be lost in the watershed every ten years. It is estimated that the greatest population increases (between 30 and 50%) will be seen in Berks County and other central areas of the watershed, given the continued migration to the suburbs and out-migration from Schuylkill County due to economic incentives.[17] Berks County alone lost roughly 4,826 acres of farmland annually from 1997-2002.[18]

In 2000, the "Schuylkill Watershed Conservation Plan" called for 200,000 acres of land to be "permanently" conserved between 2000 and 2020. Berks County estimates that 30,000 more farm acres could be preserved with a $30 million bond that would bring total preserved acreage in Berks County to 70,000 – one third of the county's farmland.[19] As of June 2005, Berks County Agricultural Land Preservation board had protected 39,878 acres, while Schuylkill County's Farmland Preservation Program had protected 76 farms on 8,863 acres since 1989 at a cost of $8.5 million.[20] Schuylkill County contributed between $100,000 and $350,000 annually, while state funds contributed $300,000 – 500,000 each year.[21] Given demand for preservation, the funding is not adequate for even current demand. According to the American Farmland Trust report, as of 2005 there were 70 farms on a waiting list for the preservation program. The program was paying $1,000/acre and preserving 4-5 farms each year with a $400,000 county appropriation.[22]

Identifying financing sources

Non-point source pollution issues create significant financing barriers, especially in the agricultural industry. With point source financing, the most equitable revenue source is almost always the polluter, usually identified as the ratepayer or taxpayer, and the institutions necessary for investing financial resources are usually well established. In an agricultural economy, however, the costs associated with improved stewardship must be borne by the farmer and then ultimately passed on to the consumer. Although this is often the most efficient system, it is not always the most equitable, given that farmers are almost always price takers in the markets for their products.

Farmers that are forced to internalize the costs associated with the environmental impact of their products are competing against farmers that do not have the same restriction. As a result, the farmer becomes the source of financing rather than the consumer, which creates an inequitable situation. The problem is equally significant with land protection. Farmers often rely on the value of their land as a primary means of wealth for retirement. By restricting the potential use of the land through zoning and other land use restrictions the farmer again becomes the source of the financing, rather than those that benefit from the implementation of those restrictions. As a result of these economic dynamics, it is very difficult to leverage sustainable revenue streams

[17] "Schuylkill Watershed Conservation Plan," Prepared for the PA Department of Conservation and Natural Resources and the William Penn Foundation, 31 May 2001, 5 Dec. 2006: 3-2 <http://www.schuylkillplan.org>.
[18] American Farmland Trust, "Challenges and Opportunities for Agricultural Viability in Berks and Schuylkill Counties," prepared for the Berks Community Foundation, Nov. 2005: 13.
[19] Ibid. 2.
[20] Ibid. 13.
[21] Ibid. 13.
[22] Ibid. 69.

sufficient to finance necessary agriculture and nonpoint source mitigation programs. To fill the revenue gap communities have relied on state and federal funding programs especially to implement water quality best management practices.

Gauging financing capacity: developing and building institutions

The lack of institutional capacity is also a major barrier to developing effective non-point source financing strategies. Financing institutions are often developed as a result of a statutory requirement for managing or changing behavior, or as a result of a compelling or pressing community need. For instance, wastewater utilities were developed as a result of public health mandates to reduce pollution related to sewage, and those utilities are regulated through permits to manage waste. Drinking water systems were developed to ensure potable water supplies. In both cases, the associated utility or enterprise entity serves as the financing institution. Unfortunately, there is no statutory requirement to reduce non-point source pollution that results from agricultural practices, nor is there sufficient pressure from the community to develop and implement these requirements. As a result, the only financing institutions that exist to fund agricultural best management practices are government programs and agencies that were developed to provide economic incentives to farmers to implement such practices.

The institutional capacity necessary to protect agricultural lands and open space is also very important and complex. Effective land protection efforts require putting easements on the land, which restrict or prohibit land use changes in perpetuity. The easement, therefore, must be "held" or controlled by an appropriate institution such as a land trust or associated government agency.[23] Though there are still significant land protection needs throughout the upper sections of the watershed, there have been some real success stories, and these successes have, in many ways, been the result of having the necessary organizations and institutions for financing land protection.[24]

The use of effective regulation and land use restrictions

The use of regulation and land use restrictions on agricultural lands is perhaps one of the most controversial issues facing communities in the watershed, and it creates a significant financing conundrum for the Network and its participating organizations. As with the other key areas of finance, we focus on the two primary agricultural issues – reducing pollutant loads from agricultural practices and the need for open space and agricultural land protection.

Reducing pollutant loads. Although regulation of point source pollution has been in place for over 30 years, nonpoint source pollution regulations at the federal level are more recent. Formal regulation of nonpoint source pollution went into effect in 1987, when Section 319 of the federal Clean Water Act was passed.[25] With the passage of the Section 319 amendment to the original legislation in 1987, state governments became responsible for creating and implementing plans to reduce nonpoint pollution. In most cases, these plans are administered by a state environmental agency, such as a department of environmental quality, control, or management or

[23] The most effective institutional arrangements often occur when there is a combination of public and private easement holding institutions in place working in partnership.

[24] There are also significant institutional needs related to many water quality best management practices. Specifically, programs that require farmers to take land out of production to install buffers or wetlands require monitoring and enforcement by associated state and/or federal agencies. As a result, capacity gaps within these agencies can reduce the impact of these programs.

[25] "Environmental Update Number 25: Preventing Nonpoint Source Pollution," (Hazardous Substance Research Centers/South & Southwest Outreach Program, Sep. 2006), 2.

the state department of natural resources. Agencies are eligible for Section 319(h) funding from the federal government, which can be used to manage, control, and reduce NPS pollution.[26] Regulating and controlling non-point pollution activities from agriculture is complicated by the inability to observe the pollutant or effluent. Therefore, we rely on indirect controls involving inputs or best management practices.

In reality, Section 319 has done little to increase regulation on nonpoint source agricultural activities, though as a result of the law the federal government does provide important funding that supports state programs across the country.[27] And, it is unlikely that either state or federal regulatory agencies will significantly increase regulation on farmers. Nonpoint source pollution control efforts remain largely voluntary, the exception, of course being stormwater management, which is discussed later in this report. There are, however, restrictions on agricultural practices that are considered to be point sources, such as concentrated animal feeding operations (CAFOs). CAFOs are managed and permitted through the NPDES process. As a result, there is a clear market-based institutional framework for financing associated best management practices because farmers managing CAFO enterprises incorporate the costs of required best management practices into the price of their products.[28] The Network's water resource restoration goals will have to be achieved within the existing regulatory framework. Therefore, the Network's focus should be on leveraging new revenue sources and implementing market-based tools that will help reduce implementation costs.

Protecting agricultural lands and open space. Regulatory controls and restrictions can be very effective tools for managing land use and land conversion. Though tools such as zoning cannot effectively influence the implementation of water quality best management practices, they can help reduce the impacts and the rate of land conversion. Again, however, Pennsylvania's governance structure makes it very difficult to implement consistent land use policies across a watershed like the Schuylkill. Implementing land use controls or regulations is very political, contentious process, and given the large number of municipalities in the watershed, it is reasonable to assume that there will be significant variations in how land use regulations are developed – or not developed – across the watershed. Land use decisions are local, and this creates a lot of inefficiency and uncertainty in Pennsylvania. A financing framework that can overcome these inefficiencies will be critical.

Opportunities for leveraging state and federal funding programs

Reducing pollutant loads. Due to the regulatory, political, and economic dynamics associated with agricultural economies and markets, state and federal funding and technical assistance programs have become the primary funding sources for implementing water quality best management practices. And, as with abandoned mine drainage, a relatively modest investment or application of these funding programs in the Schuylkill watershed could lead to significant improvements in the quality of water resources serving millions on people in the state. However, as with AMD, there are other regions in the state with robust agricultural economies that are competing for these resources. A critical role for the Network should be to develop and

[26] Ibid.

[27] In 2006, $204.3 million in grants were rewarded to states, territories, and tribes.

[28] It should be noted that there are funding programs that essentially subsidize the costs associated with regulated activities required by CAFO NPDES permits. Therefore, the entire cost is not internalized by CAFO permits. However, the financing institutional framework remains in place.

implement an initiative focusing on maximizing the return from these programs. There are more than 20 different USDA funding and technical assistance programs available to communities and farmers. Though not all of them are applicable to farmers in Pennsylvania and the mid-Atlantic region, there are tremendous opportunities for increasing federal resources coming into the region.

Though there are opportunities to increase federal and state funding in the watershed, there are administrative barriers that must be addressed. One critical problem related to federal Farm Bill programs is the lack of technical assistance capacity to work with farmers to implement associated best management practices. Natural Resources Conservation Service (NRCS) offices often do not have adequate staff and resources to assist farmers in applying for funds and implementing best management practices, and as a result, programs are often left underutilized. According to a report issued by the Chesapeake Bay Foundation, conservation efforts by agriculture producers throughout Pennsylvania are severely limited by available funds and technical assistance, which fall far short of current demands.[29] According to the report and NRCS officials, only one out of three producers in the state who seeks financial help for conservation practices typically receive it. The total conservation backlog in Pennsylvania – the amount of unfunded conservation support requested by producers – was $37.5 million in 2004 (source: NRCS).[30] The Network and its partner organizations could provide a critical service to farmers in the watershed by facilitating the implementation of these programs. In fact, it could one of the most efficient and cost effective strategies related to achieving water restoration goals.

Funding land conservation. Though land conservation is primarily a local issue, the state has committed significant resources to land protection in the watershed. Pennsylvania's new Growing Greener II law – approved by Pennsylvania voters in May 2005 – will be supported by a $625 million environmental bond. The law stipulates that the Pennsylvania Department of Conservation and Natural Resources (DCNR) will receive a total of $217.5 million in bond funds for state park and forest improvements, community recreation and conservation needs, and open space preservation. The first round of funding included $31.5 million to upgrade and improve state parks and forests, and $3.7 million for open space protection.[31]

A provision in the new law sets up an Environmental Block Grant Program that allows counties to address local land conservation priorities. Counties can designate up to $90 million over the life of the bond program by picking from state agency appropriations grant categories to target specific needs at the county level. To help get projects up and running, a list of previously non-funded, eligible projects has been provided to counties, although they also designate projects not on the list. DCNR's portion of the Growing Greener II funds are awarded through the existing Community Conservation Partnerships Program, which includes several additional funding sources. Except for Heritage Parks, all other grants are combined into an annual application cycle and use a single application format and process. [32]

[29] "Voices of Agriculture: A summary of fourteen listening sessions with Pennsylvania Producers," Presented by The Chesapeake Bay Foundation and the Brubaker Corporation, April 2006: 4.
[30] Ibid.
[31] "Growing Greener II Strengthens DCNR's Helping Hand," Pennsylvania Land Trust Association, 2005, 15 Sep. 2006, <http://conserveland.org/features/gg2_dcnrarticle>.
[32] Ibid.

The appropriate role of taxes and fees

Agriculture water quality programs are administered almost exclusively through federal Farm Bill and state funding and technical assistance programs. Therefore, they are supported through state and federal revenue. Land conservation efforts, however, are much more local and much more complex. Given that land protection will always primarily be a local responsibility, the responsibility for funding and financing land protection programs will remain with local governments and land protection institutions such as land trusts.[33] As with any financing need, effective land protection programs will require sustained, dedicated revenue streams.

There are many innovative approaches to leveraging revenue at the local level. Communities across the country have traditionally supported land protection programs with revenue instruments such as property or ad valorem taxes, real estate transfer taxes, impact fees, and other locally controlled resources. The most appropriate revenue tool will be determined based on the specific fiscal and political situation in each community. Fortunately, the two agricultural producing counties in the Schuylkill River watershed have developed relatively aggressive land protection programs and have supported these programs with local funding. These county-led efforts are critical because the multi-jurisdictional nature of the state makes developing a unified funding strategy difficult.

When we consider the use of taxes to support conservation efforts, we normally focus on the process of collecting taxes to fund programs. However, there are also tax incentive tools that show promise in accelerating the pace of conservation and stewardship programs. For example, The Resource Enhancement and Protection Act of Pennsylvania, or REAP, created by House Bill 2878 and its companion Senate Bill 1286, provides agricultural producers with transferable tax credits to implement best management practices. The program provides an innovative incentive structure to help address agricultural pollution, while supporting farmers to keep their farms viable. Farmers can choose to receive tax credits paying for 50% -75% of BMP costs once an approved project has been done, or they can choose to sell the credits to other corporations or individuals. The program takes advantage of private investment, inviting Pennsylvania businesses of all types and sizes to participate. Personal, state, and businesses tax credits of up to $150,000 per farm are available to producers. Bills introduced in 2006 will be reintroduced amended in January 2007.[34]

The use of market-based programs

Given that the goal of financing is to maximize the return on investment, reducing costs and creating efficiencies is the foundation of effective financing programs. As a result, market-based programs have become extremely important in the financing process. The goal of leveraging market behavior is to reduce costs and increase program efficiencies. Market programs are very simple in concept: the power of supply and demand results in the most efficient allocation of resources. This concept has served as the foundation for environmental market-based programs. The following is a review of a variety of these programs that can help reduce costs associated with implementing best management practices in the Schuylkill watershed.

Water quality trading. One of the most actively debated and analyzed market-based tools is nutrient or water quality trading. Though difficult to define, water quality trading is basically a tool to re-allocate pollution reduction responsibilities in a way that reduces the overall cost of

[33] With the support of the state programs described in the previous section.

[34] For more information, visit <http://www.cbf.org/REAP>.

compliance. The trading programs that have emerged thus far can be grouped into four general categories: managed trading, trading associations, and market-like trading programs, and small-scale offset programs.[35] The lines between these categories are often blurred, and usually trading programs become a hybrid of these categories. Such is the case with Pennsylvania's new trading program.

The Pennsylvania Department of Environmental Protection (DEP) recently published its Trading of Nutrient and Sediment Reduction Credits – Policy and Guidelines, which outlines the state's proposed trading program. The guidelines focus on Chesapeake Bay watershed issues, though presumably the guidelines will apply to watersheds in the rest of the state as the program is expanded. Going beyond water quality trading programs that deal exclusively with point source polluters, i.e. trading associations, Pennsylvania's program allows for trading between point-source polluters and nonpoint source polluters, incorporating agriculture and urban runoff. The program addresses nitrogen, phosphorus, and sediment. The trades must be "comparable" (nitrogen must be traded for nitrogen, phosphorus for phosphorus, sediment for sediment), and trades must be accounted for as mass per unit of time. Participating trading parties must meet basic requirements, including the implementation of baseline best management practices. Trading must not cause impairment of local water quality, and trading must remain consistent with established TMDL requirements.

Supporters of the program argue that the system has the potential to be far more cost-effective than current programs, and will shift some of the responsibility from point source polluters that account for a relatively small portion of overall pollution to non-point source polluters without crippling agriculture and other industries. Skeptics point out a number of challenges the program may face: point source polluters and nonpoint source polluters may be reluctant to depend on one another to meet regulatory requirements; transaction costs, in some cases, may be high, canceling out anticipated savings; monitoring of nonpoint source pollution is extremely difficult; the efficacy of best management practices varies over time depending on weather and climate; and benefits of some best management practices are not seen for years, effecting the time scale of benefits to watersheds. In addition, some are concerned that farmers will engage in "double dipping", using local, state or federal funds to implement best management practices, and then turning to the program to pay for implementation.[36]

Though Pennsylvania's program is currently focused on the Chesapeake Bay watershed, it is important to understand the underlying principals of the program and how they might apply to watersheds like the Schuylkill. These types of trading programs, specifically those that allow point source polluters to purchase credits from nonpoint source polluters such as farmers, are essentially designed to subsidize pollution reduction in the agricultural or nonpoint sector sectors. It is often cheaper for farmers to reduce pollutants than it is for wastewater facilities, so regulators allow wastewater systems to pay for nonpoint source pollution reduction, usually on agricultural lands. In return, the wastewater system is relieved of some of its regulatory burden.[37] It is no more complex than that. The same concept can be applied to other water

[35] Cy Jones, et al., "Water-Quality Trading: A Guide for the Wastewater Community" (The McGraw-Hill Companies, 2006) 14.

[36] For more information, visit <http://www.dep.state.pa.us/river/river_trading.htm>.

[37] Wastewater systems are the most logical purchaser of pollution reduction credits because they are under regulatory control. This provides the "cap" part of these trading programs. It reasonable to assume that other permitted entities, such as communities with MS4 permits may become purchasers of emission credits also.

resource issues. For example, the City of New York found it to be cheaper to reduce pollution in their source water areas rather than pay for expensive treatment upgrades. Essentially, they "traded" the reduction responsibility to stakeholders in the upper part of the watershed, thereby reducing the cost of ensuring safe, potable water. Though these transactions were not part of codified trading programs, the results were the same. Resources were allocated to the least-cost, most efficient use, thereby maximizing return on investment. The same opportunities exist for the citizens relying on water resources within the Schuylkill watershed. It is possible, and in fact it is likely, that cost reductions could be gained by focusing on the protection of the upper part of the watershed.

Transfer of development rights. In addition to the trading model described above, other market-based programs can also be leveraged to reduce the costs associated with protecting open space and agricultural lands. One of the most effective tools used across the country, including the state of Pennsylvania, is the transfer of development rights, or TDRs. TDR programs work by transferring the development opportunity from priority agricultural or open space areas (sending zones) to areas more suited for development (receiving zones), thereby preserving farmland.[38] The most common TDR program allows the landowner (in the sending area) to sell the development rights to a developer who then uses those development rights to increase the density of houses on another piece of property (in the receiving area). A variation of that type of a TDR would be a situation in which the developer transfers the development rights from one property to another property the developer owns. The higher density that developers are able to realize is the incentive for them to buy development rights.[39]

Other market-based issues. One key issue that goes beyond the scope of this report and project is the need to protect agricultural economies. In many ways, the need for land conservation in agricultural areas is a strong indicator of stress in the agricultural economy. In short, protecting farms does not necessarily protect farmers and farming economies. The Schuylkill River watershed is rapidly growing. As this growth continues, agricultural economies will become more fractured, and the pressure for landowners to leave the industry will increase. There is a direct connection between the health of the farming economy and the health of the region's water resources. This is a critical area of concern, and should be an area of focus for the Network.

Recommendations for the Network

The Environmental Finance Center recommends that the Network focus on three core issues: implementing water quality programs, support land conservation efforts, and supporting farming economy initiatives. Therefore, we recommend the following next steps:

Conduct an "audit" of federal and state water quality and technical assistance funding programs. There are dozens of state and federal technical assistance and funding programs available to farmers. Though not all of them are relevant to farmers in the Schuylkill watershed, it is very likely that all available resources are not being leveraged. Participating Network partners should sponsor and support a detailed analysis of these programs. Where resource gaps

[38] American Farmland Trust, "Challenges and Opportunities for Agricultural Viability in Berks and Schuylkill Counties," prepared for the Berks Community Foundation, Nov. 2005: 26-27.

[39] TDR programs have been used very effectively in Pennsylvania. For more information on TDR programs in Pennsylvania, see "Transfer of Development Rights: A Flexible Option for Redirecting Growth in Pennsylvania," an 84-page manual features text and illustrations that provide a basic understanding of what TDR is and how to effectively use it in Pennsylvania communities.

exist, partnerships should be developed to increase implementation capacity. An effective case study for this approach is the Chesapeake Bay Foundation's work on assisting farmers and NRCS offices in providing technical assistance.

Focus Network resources on developing and supporting financing land conservation programs. It is our recommendation that the Network focus its resources, specifically those in the agricultural work group, on supporting efforts to protect resource lands and critical open space throughout the watershed. One of the "truths" associated with environmental finance is that it is cheaper to protect than it is to restore, and preventing the impacts of rapid development and stormwater runoff on water resources is critically important to the success of the region's financing and implementation efforts. Protecting agricultural lands and the region's agricultural economy is the most effective way to manage population growth and to encourage new development in appropriate areas.

Leverage community partners to develop market-based farming programs. In November of 2005, the American Farmland Trust (AFT) produced a report for the Berks County Community Foundation called the *Challenges and Opportunities for Agricultural Viability in Berks and Schuylkill Counties*. The purpose of the study was to analyze the agricultural industry in Berks and Schuylkill Counties and to determine what actions could be taken to sustain the industry for the next 25 years.[40] In addition to providing a robust analysis of the status of agriculture in the watershed, it provides a thorough list of next steps and recommendations for the communities to take to sustain the agricultural industry. It is our recommendation that the Network use these recommendations generated by AFT as the basis for its strategic goals. The report outlines a variety of market-based tools, tax incentives, economic development programs, and technical assistance programs that, if fully implemented, would reduce the cost associated with protecting water resources.

[40] American Farmland Trust, "Challenges and Opportunities for Agricultural Viability in Berks and Schuylkill Counties," prepared for the Berks Community Foundation, Nov. 2005: 1.

Wastewater Management

The source water assessment conducted by the Philadelphia Water Department identified pathogens as being a critical threat to the region's water resources. Though pathogens in the Schuylkill result from both human and animal waste, our analysis focused on wastewater management. Pathogen contamination from sewage results from a variety of sources, including faulty septic systems, combined sewer overflows, and wastewater collections systems with inadequate or nonexistent treatment. To fully address pathogen challenges, efforts will need to be taken to bring wildcat sewers into public systems, improve monitoring and enforcement at all wastewater treatment facilities, update and maintain septic tanks, and improve decentralized wastewater management. All of these issues have very significant financing challenges.

Determining the scale of the effort: quantifying costs

Pathogen discharges from wastewater treatment plants are the result of either inadequate system capacity or inadequate treatment technologies or performance. In many cases, reducing pathogen pollution can be corrected through more efficient permitting criteria. However, it is unclear what the costs associated with watershed-wide permitting approach would be. Obviously, the costs would be determined by capacity upgrade needs as well as technological needs such as ultra-violet treatment.

Adding to the complexity of quantifying costs is the potential need for more effective nutrient management. Though pathogens are the primary threat to drinking water resources in the watershed, there are significant concerns related to excessive nutrient loads from wastewater treatment plants. Upgrading treatment plants in an effort to control nutrient pollution could add tens of millions of dollars of restoration costs to each affected facility. Ultimately, an accurate cost analysis will require a clearer understanding of performance criteria, which would be accomplished most effectively through a watershed permitting process.

Another critical capacity issue is the costs associated with updating and maintaining septic tanks and onsite wastewater systems. It is not clear how big of a problem septic systems are in the watershed at this time, but it is reasonable to assume that the problem will increase, especially in the upper parts of the watershed where there are significant rates of development and land conversion. Clearly gauging the scale of the septic problem will be important.

Identifying financing sources

Unlike non-point sources of pollution, the most appropriate source of revenue to fund wastewater treatment upgrades are the ratepayers within each system. In the end, it will be the ratepayers that will be responsible for financing wastewater treatment upgrades. However, as with many other intractable environmental problems facing communities across, there are a variety of political and administrative barriers that prevent communities from leveraging the revenue sources necessary for addressing wastewater treatment needs. There are two key issues related to leveraging revenue sources facing community leaders and wastewater treatment operators in the watershed. The first is the need to sewer wildcat systems and communities illegally discharging into local waterways. The second is the need to fund wastewater treatment advancements and upgrades through increased fees and services charges.

Wildcat systems – illegal community wastewater systems that discharge into local streams and waterways – create significant financing challenges for state and local wastewater officials. Providing adequate sewer services to these types of communities usually requires system upgrades and installation technologies that are extremely expensive on a per-household basis.

As a result, it can be very difficult to bring these communities into compliance without some type of financial subsidy, either from the state or from larger wastewater systems or public utilities. In effect, it is often impossible to directly charge the entire cost of service to the individual polluter.

Though wildcat systems present a significant financing challenge, in many ways the bigger challenge related to upgrading the level of service in existing wastewater systems. Restoring and protecting water resources in the Schuylkill watershed will require community systems to implement costly system upgrades. The systems themselves will be responsible for paying the costs associated with these upgrades, which in turn will pressure system administrators to increase rates – something they are usually very hesitant to do. Therefore, though the most appropriate financing source is clearly identified – the ratepayers – the process for leveraging that source is wrought with political challenges.

Gauging financing capacity: developing and building institutions

In addition to having clearly defined revenue sources, there are usually no institutional gaps related to financing wastewater management.[41] Wastewater systems or authorities usually have the institutional capacity to acquire, invest, and manage the fiscal resources necessary for improving system performance. As with most other funding or financing needs, the capacity breakdown is typically political.

Opportunities for leveraging state and federal programs

With the passage of the 1987 Amendments to the Clean Water Act (known as the Water Quality Act of 1987), the federal government shifted from supporting water infrastructure funding through grants to supporting these efforts through loans. With the development of the State Revolving Loan Fund program (SRF), the primary financing assistance tool available to local communities and public systems comes in the form of low interest loans. Though there are a variety of technical assistance programs available, the vast majority of the support for facility upgrades is provided through the SRF program. In Pennsylvania, financing through the SRF program is managed and administrated by the Pennsylvania Infrastructure Investment Authority, or PennVest.

In 2006, PennVest financed more than $70 million in water infrastructure projects, including stormwater, drinking water, wastewater, and brownfields remediation projects. One of the most important outcomes of the SRF system is that it requires participating communities and water systems to maintain sustainable, effective fiscal enterprises. As a result, efficiently managed programs are rewarded with low-interest rate loans.[42] However, even low interest rate loans must be paid back to the lender, and ratepayers are usually hesitant to borrow money to pay for system improvements that they do not understand or view as too costly. As a result, financing wastewater system improvements necessary for protecting the region's water resources will also require a regulatory approach.

Use of effective regulation

As the source water assessment indicates, perhaps the most effective tool available for controlling pathogen pollution from wastewater facilities is aggressive, watershed-based

[41] It should also be noted that communities illicitly discharging into the watershed through wildcat systems typically do not have the institutional capacity to finance effective wastewater management.

[42] Subsidized loans are essentially the equivalent of a grant.

permitting programs through the Pennsylvania Department of Environmental Protection. As with most environmental issues, effective regulation often results in the development of effective financing strategies and programs. If the state develops and enforces more effective discharge permits, the water systems will be required to finance the necessary upgrades. As the source water assessment indicates, successfully protecting water resources in the Schuylkill watershed will require wastewater systems to increase the level of service or effectiveness of their systems. And, perhaps the most effective tool available to communities in their efforts to encourage the installation of treatment advancements by wastewater systems is through the use of effective, enforceaable permits and regulatory requirements.

Wastewater management has an advantage over other watershed issues. Because of the existence of wastewater authorities and enterprise programs, the institutional structure already exists to effectively comply with regulations and permit requirements. However, complying with more restrictive permit requirements will force system managers and administrators to raise user fees and rates. Therefore, the financing capacity gap is often the lack of political will necessary to develop, promulgate, and enforce necessary water quality regulations.

The appropriate role of taxes and fees

The most appropriate financing source for wastewater management is the ratepayers in the system and the most effective tool available for leveraging this source is a wastewater fee. Though there are examples across the country of communities using taxes to fund infrastructure programs, the most efficient approach is to leverage utility fees.

Recommendations for the Network:

There are two core wastewater issues that must be addressed in order for the Network to successfully accomplish its goal of protecting and restoring water resources in the Schuylkill watershed. The first is to bring wildcat communities into compliance. The second is to require more restrictive wastewater treatment at existing systems. EFC makes the following recommendations to the Network.

Facilitate a community-based process to develop a wildcat system remediation strategy. Bringing communities with wildcat sewage systems into compliance will require a coordinated, multi-stakeholder driven process focusing on all areas of community capacity including political, administrative, and fiscal. The Network should convene a task force or committee to identify the most effective and efficient technologies, implementation options, funding and financing strategies, community and system institutional requirements, as well as the role of state and municipal governments, agencies, and authorities. Given its multi-stakeholder structure, the Network is uniquely positioned and qualified to facilitate this process.

Advocate for more aggressive and comprehensive wastewater system permit enforcement. As the source water assessment indicates, meeting water protection and restoration goals will require more effective, consistent wastewater permits to be enforced throughout the watershed. Obviously, this will require the state to be significantly engaged in the process. This is also a process that would benefit greatly from the Network's capacity to organize and facilitate multiple stakeholder interests. The idea of implementing watershed-wide permits, as well as more restrictive wastewater permit requirements, will be resisted and debated by many in the community. The Network has an opportunity to inform this debate and to represent the interest of the watershed and the region's water resources. Our recommendation is for the Network

convene state, local, and regulatory officials to discuss the need for a more aggressive permitting approach and to outline the necessary process for making watershed permits a reality.

With both of these issues, the Network has an opportunity to work with state and local regulatory officials to clarify the necessary improvements in wastewater management throughout the watershed and to facilitate the process for more effective financing and implementation strategies.

Stormwater Management

Over the past twenty years, stormwater management has become increasingly complex.[43] A combination of state and federal stormwater laws – including Act 167 and Phase II NPDES permit program requirements – are forcing hundreds of Pennsylvania communities, including many in the Schuylkill River watershed, to re-examine how they finance and support stormwater programs. The urgent need to upgrade or replace older infrastructures and the emergence of total maximum daily load requirements for polluted water bodies are strong reasons for communities to seek a consistent source of stormwater funding.[44] This struggle to develop sufficient revenue sources throughout multiple jurisdictions and municipalities is creating a critical financing need throughout the state and the Schuylkill watershed. It also presents one of the most significant challenges to the Network in its efforts to achieve its water protection goals and strategies.

The source water assessment identifies the impacts of stormwater from developed lands as being perhaps the most acute threat to water resources in the region. And, as the population in the region grows, it is imperative for community leaders to resolve some of the more intractable barriers associated with the financing and implementation of best management practices. One of the most significant barriers facing communities is Pennsylvania's governance structure. As Nathan Walker points out in his paper *Stormwater Management In Pennsylvania,* EPA most likely did not have Pennsylvania in mind when the agency developed the Phase II stormwater program for the entire country.[45] Effective stormwater management requires a watershed approach, yet the responsibility, and power, to develop and implement effective stormwater programs resides at the municipal level. Municipal governments are responsible for controlling land use, raising revenue, and financing stormwater best management practices, yet these communities often do not have the capacity to effectively manage what has become a very expensive local infrastructure requirement. In short, the existence of multiple incorporated jurisdictions and municipalities makes it very difficult to effectively implement and manage stormwater programs. The key to success is efficiency, and the fragmented nature of the state's municipalities creates significant inefficiencies. It is this lack of efficiency and coordination that creates the most significant leadership opportunity for the Network.

Determining the scale of the effort: quantifying costs

The Schuylkill River source water assessment identified stormwater as being the primary cause of impairment in the Schuylkill River watershed, with a total of 273 stormwater impaired stream miles. The majority of these impairments are located within Montgomery and Philadelphia Counties, the watershed's most populous counties.[46] Compounding the threat is the fact that the best management practices necessary for mitigating the impacts of stormwater are often extremely expensive, especially in existing urban areas. The costs associated with addressing the issue throughout the watershed are in the hundreds of millions of dollars, and it will be the citizens of the watershed that will bear most of those costs. Clearly, financing stormwater

[43] Janice Kaspersen, "The Stormwater Utility: Will it Work in Your Community?" Stormwater: the Journal of Surface Water Quality Professionals Dec. 2001: 1.

[44] Ibid. 2.

[45] Nathan Walker, "Stormwater Management In Pennsylvania: Planning & Funding Options for Local MS4 Compliance," 13 May 2005: 13.

[46] "Schuylkill River Watershed Initiative: Protecting our Source," Submitted by the Philadelphia Water Department and the Partnership of the Delaware Estuary, 2004: 5 < www.epa.gov/twg/2004/2004proposals/04schuylkill.pdf>.

management programs presents a significant to the Network and its participating communities and stakeholder groups.

Determining the scale of the stormwater financing challenge requires more detailed analysis. The cost of stormwater best management practices can vary widely, with urban and ultra urban best management practices being by far the most expensive. However, preventing future stormwater management costs is one of the most effective and efficient financing tools available to local leaders, and the immediate costs associated with many of these low impact development best management practices are significantly less expensive then those associated practices that are necessary in urban retrofit situations. Therefore, the scale of the problem needs to be defined in terms of existing retrofit requirements and new development requirements.

Identifying financing sources

What makes financing urban stormwater management such a challenge is the complexity and difficulty of leveraging sufficient revenue sources. As a result of federal Clean Water Act requirements and the corresponding state implementation and enforcement programs, it is local governments that are responsible for developing and implementing stormwater best management practices. Therefore, it will ultimately be the citizens of the watershed that pay for stormwater management programs and best management practices in their communities. And in fact, that is the way that it has always been. What has changed is the type of programs that taxpayers must now pay for.

The Water Quality Act of 1987 had a profound impact on how communities manage and pay for stormwater and wet weather control programs. Prior to 1987, most communities viewed stormwater as primarily a flood management issue, and in many communities, this is still a primary concern. The goal of most stormwater programs was to convey water away from property as quickly as possible. All that changed with the passage of the Water Quality Act. That law required communities to consider the impact of stormwater on water quality. The law also provided a regulatory framework to ensure local and state compliance. As a result, the rules had changed. The local requirements and responsibilities were significantly increased, while the responsibility for covering the costs associated with these increased responsibilities remained with local governments. As a result, the capacity of the financing sources, institutions, and investment tools all came into question.

Gauging financing capacity: developing and building institutions

One of the most significant barriers facing communities throughout the Schuylkill River watershed is the lack of institutional capacity to finance stormwater management. Stormwater management has traditionally been financed through a variety of public agencies. This was often the most appropriate system, especially given the fact that most stormwater management plans focused on flood management and conveying water away from property as quickly as possible. In effect, pouring concrete was the most common stormwater management tool. However, when it became necessary to manage stormwater based on water quality standards, many communities realized that a more efficient institutional arrangement was necessary to facilitate the financing process. As a result, the development and implementation of enterprise-based programs, like those associated with wastewater and drinking water, became much more common. Unfortunately, the development and implementation of enterprise-based programs is not an option in Pennsylvania.

Pennsylvania state law currently allows only the largest of all municipalities to develop stormwater enterprise programs, commonly referred to as stormwater authorities.[47] As a result, Pennsylvania communities are prohibited from leveraging the same sustainable, dedicated revenue streams that are available to other communities across the country. This, coupled with the Pennsylvania's municipally based governance structure,[48] creates a very inefficient institutional framework, which is perhaps the most significant barrier facing community leaders throughout the state.

The role and function of stormwater enterprise programs

The development of stormwater enterprise programs has been motivated by two primary financing needs. The first is related to revenue. A stormwater utility (or authority) is essentially a special assessment district set up to generate funding specifically for stormwater management. Users within the district pay a stormwater fee, and the revenue that is generated directly supports the maintenance and upgrade of existing storm drain systems; development of drainage plans, flood control measures, and water-quality programs; administrative costs; and sometimes construction of major capital improvements.[49] By collecting fees, communities ensure a stable source of revenue to finance the operations and maintenance of stormwater programs. And, unlike a stormwater program that draws exclusively on the general tax fund or uses property taxes for revenue, enterprise funds create a direct link between the polluter and the responsibility to pay.

The second reason for the development of stormwater enterprise programs is the need to gain administrative and fiscal efficiencies by coordinating and consolidating stormwater management programs. Often communities will implement various aspects of stormwater management programs within a variety of government agencies and programs. This often results in redundant programs and inefficient implementation of programs and investment of fiscal resources. As a result, costs increase, which decreases the community's return on investment.

Opportunities for leveraging state and federal programs

Because implementing and financing wet weather management programs is a local responsibility, state and federal programs will always serve as tools for supplementing local financing efforts. As with wastewater management, the federal government has focused its revenue assistance on the SRF program, and in Pennsylvania, PennVest does issue loans, as well as limited number of grants, on programs that target innovative stormwater best management practices. However, using subsidized loans requires communities to develop and leverage sustainable revenue streams and financing programs.

Perhaps the most important contribution the state can make to this issue is to clarify the laws governing water authorities, thereby allowing communities to develop efficient and sufficient stormwater programs.

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[47] The terms authority and utility are often interchanged. Technically, an authority refers to a governmental or not-for-profit enterprise.

[48] Pennsylvania's governance system essentially requires each community to develop its own stormwater and wet weather programs. This removes the opportunity for creating fiscal efficiencies by combining institutional and administrative costs and responsibilities.

[49] Janice Kaspersen, "The Stormwater Utility: Will it Work in Your Community?" Stormwater: the Journal of Surface Water Quality Professionals Dec. 2001: 2.

As with most water-related environmental and natural resource issues, the responsibility of controlling and managing stormwater runoff is concentrated at the local level. As a result, local governments have the responsibility to finance stormwater management programs. [50]

Use of effective regulation

Unlike other non-point source pollution issues, there is no lack of regulatory controls and requirements related to stormwater management. The federal NPDES and MS4[51] permit program, Pennsylvania's Act 167 stormwater planning requirements, and the Total Maximum Daily Load (TMDL) requirements of the Clean Water Act, have all created a rather complicated, if not impressive, regulatory framework in the state. From a financing perspective, the combination of all of these programs and tools has created confusion and ambiguity in many communities. This, in turn, has often led to inaction on the part of local communities, thereby drastically reducing the likelihood that efficient, stable financing programs will be implemented. What is needed are clear, concise recommendations for coordinating the enforcement of each of these regulatory requirements. This need creates a significant administrative and leadership opportunity for the Network.

Coordinating these regulatory programs is critical because they play such a significant role in the financing process. Not only is stormwater the most significant threat to water resources in the region, it is also by far the most expensive problem to address. Therefore, the most effective financing tool is to *prevent* the problem from occurring in the first place. This is done through effective land use planning and land use control regulations. By requiring new development and redevelopment projects to incorporate low-impact development (LID) techniques, communities can significantly reduce the overall costs associated with stormwater management. As with other critical financing needs in Pennsylvania communities, the state governance structure creates a real barrier in reducing stormwater management costs through effective LID requirements. Though the state has developed recommended LID and land use ordinances, the responsibility and authority to implement LID regulations and requirements is at the local level. With hundreds of incorporated municipalities in the watershed, it is very difficult to ensure consistency. Again, this creates inefficiency through the financing process.

Recommendations for the Network

Up to this point, the focus of the Network has been to use existing grant funds to implement innovative stormwater best management practices and control technologies. These types of demonstration projects are often the most effective way for organizations and communities to educate citizens and community leaders on the types of innovative options available for protecting and restoring local watersheds and water resources. However, as the Network moves forward, it should consider its ability to sustain these programs, as well as its ability to influence the financing process in communities across the watershed. Ultimately, successfully managing stormwater will require significant changes in the state's regulatory and governance structure, and the Network should focus its energies on facilitating those changes.

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[50] Though enterprise programs are a critically important financial tool, it should be noted that the ability to develop these programs will not by themselves solve the region's stormwater financing problems. Most communities across the country only collect enough in fees to finance the operations and maintenance of stormwater systems. The average monthly fee for a stormwater enterprise program is between $3 and $4. This means that capital infrastructure needs are still financed through General Fund resources. Therefore, generating stormwater enterprise fees is often only one component of a sustainable financing strategy.

[51] MS4 refers to Municipally Separate Storm Sewer Systems.

Focus on new development and land protection. The most significant threat to the water resources throughout the watershed is new development, specifically development in the wrong places done in the wrong way. The Network should focus on working aggressively to protect agriculture and open space in the upper part of the watershed. Preventing stormwater problems in the watershed is much less expensive than fixing them. For the same reason, the Network should also continue its efforts to implement low-impact development standards in communities across the watershed. There have been many community efforts throughout the region working with local governments to implement low impact development and stormwater standards. The Network should concentrate on continuing these efforts.

Work with communities to develop strategic approaches to financing and implementation. What is needed at the local level is a business plan approach to financing and implementing stormwater and wet weather management programs. Some common characteristics are evident among successful stormwater utility programs. The most successful programs have relied heavily on a business plan model, which guides both the program evolution and funding decisions. The strategy for accomplishing the program is defined, the type and magnitude of costs are projected, resource requirements are determined, timing issues are resolved, and then the analysis of specific funding mechanisms take place.[52] The Network has an opportunity to work with state leaders, NGO's, academic institutions, and other stakeholder interests to develop technical assistance programs that focus on implementing this business plan approach in communities across the watershed.

Continue to focus on public education and outreach. A real strength of the Network has been its focus on education and outreach. This is critical in the financing process because it provides a way for local and state officials to communicate to their citizens and constituents the value of their investment, and the return to their community. In most communities, "needs" are the key driver of stormwater program and funding strategies. Authority, capability, and a clear vision of the mission are essential, but in the absence of compelling needs local government leaders apply their attention and resources elsewhere.[53] And, it is often the citizens of the community that identify and define these needs. The Network should focus its community outreach and education resources on this issue. As mentioned throughout this report, one of our primary goals was to provide recommendations to the Network on how it can strengthen and leverage its role in the financing and implementation process. One of the most effective ways to accomplish this would be to work in partnership with state and community officials to develop strategic education and outreach programs across the region.

[52] "Guidance for Municipal Stormwater Funding," prepared by the National Association of Flood and Stormwater Management Agencies under a Grant Provided by Environmental Protection Agency, Jan. 2006: 2-2.
[53] Ibid. 2-3.

Recommendations for Moving Forward

Develop unified restoration goals. One of the strengths of the Network is its ability to tap into the many studies, planning efforts, and conservation and protection strategies being developed in communities across the watershed. In addition to the source water assessment, there have been watershed protection plans developed, TMDL studies implemented, Act 167 and MS4 permits developed (and ultimately enforced), as well as a host of other planning and implementation efforts focused on protecting water resources throughout the watershed. The opportunity to leverage all of these efforts is a critical benefit for the Network and its participating organizations. However, there does not appear to be a codified, unified restoration and protection plan in place. The assessment identified the threats to drinking water resources, but it does not clearly establish pollution reduction goals, strategies for reaching these goals, or strategies for implementation. The Network has a unique opportunity to formalize and codify a water resources restoration plan and strategy.

Large-scale ecosystem restoration efforts are successful when there is a unifying theme, implementation plan, and template for success. The decision by watershed leaders to combine drinking water protection efforts with water quality protection efforts was based on an implicit understanding that the unifying theme was the need to protect and manage water resources. The goal of each organization or institution participating in the Network may be different. There are constituents and stakeholders targeting myriad issues including water quality, stormwater management, wastewater management, abandoned mine drainage, drinking water protection, habitat, and open space protection to name a few. The power of this type of approach is that by facilitating the implementation of a broad number of objectives and programs through an equally broad network of partner organizations, institutions, and communities, the larger collective goal can be more effectively and efficiently realized and maintained. The challenge is in harnessing and leveraging the necessary leadership and institutional structures necessary for sustained implementation.

This is a very important next step in the financing effort. With cost estimates for restoring and protecting water resources in the hundreds of millions, if not billions of dollars, it is critical that local and state leaders clearly define the scale of the problem, associated costs, and the strategy for achieving program goals. Successfully protecting the watershed will require the use of public revenue, and leveraging the necessary taxes and fees will require a clear understanding of how the resources will be invested and how they will allow communities to reach targeted goals and strategies. The financing process will require a mosaic of resources and tools, but the overall goal must be clearly defined. Therefore, our recommendation is that the Network lead this planning effort.

Conduct a thorough cost analysis. Successfully financing anything is very difficult, if not impossible, without a clear understanding of the associated costs. We have identified the relative scale of the costs associated with each of the four areas of concern, but a detailed cost study was beyond the capacity of this project. A cost analysis or study is critical, however, because it will not only identify the costs associated with specific best management practices and restoration strategies, but it will also help to identify the need for various financing instruments, as well as the role and responsibility of various levels of government, and the most appropriate revenue generating tools.

Adopt a green Infrastructure approach. At its core, the development and implementation of the Schuylkill Action Network was the logical next step in the region's watershed protection efforts. Resource experts have been insisting for years that communities must embrace a more comprehensive approach to watershed protection, thereby incorporating critical issues such as drinking water quality and quantity through the protection of source water resources, wet weather management, and water quality programs. From an efficiency point of view, this type of comprehensive approach makes sense because it offers a structure for addressing multiple community priorities thereby reducing implementation costs, and increasing the return on the community's investment. However, water resource protection is in many ways just the first step. The next step is for communities to incorporate environmental programs, initiatives, and goals into a unifying green or natural infrastructure plan. By adopting a green infrastructure approach, the Network would provide community leaders with a very effective tool for coordinating natural resource protection efforts, thereby increasing return on investment. In short, a green infrastructure approach would provide the Network leadership with a very effective implementation and organizational strategy.

A green infrastructure framework can help coordinate and incorporate a broader array of community priorities and programs. For example, a major threat to water resources in the Schuylkill River watershed is directly related to agricultural best management practices. However, an equally threatening situation relates to the loss of farmland within the region. Implementing aggressive water quality best management practices can be in direct conflict with trying to reduce pressure on farmers thereby keeping land in agricultural production. If farmland is lost and developed, communities face even greater water quality threats. With a green infrastructure approach, the role of working lands is incorporated into regional decision-making efforts. Green infrastructure planning can articulate the role of working lands in the regional landscape. As a result, local leaders can develop more effective land management tools that work to protect critical resource lands, thereby accomplishing multiple community objectives. The actual on-the-ground activities may not be any different, but it reduces inherent conflicts and provides a framework for more effective utilization of limited fiscal resources.

There are other potential barriers facing the restoration effort that could be resolved with a broader green infrastructure approach. One of the strengths of the Network effort is that it highlights the connectivity of a watershed. What happens upstream has real downstream impact. Therefore, everyone has a role to play in the outcome. This is especially true when considering drinking water protection. Those communities that rely on clear raw water for drinking water needs are very concerned, or should be concerned, about what happens upstream.

However, when considering drinking water, upstream ends at the intake pipe. In the Schuylkill River watershed, there is very little incentive, in respects to drinking water protection, for leaders within the city of Philadelphia to fund aggressive stormwater and water quality programs. If the benefits of these actions are entirely downstream of water intakes, there will be little incentive to spend limited fiscal resources on those activities. This not only impacts downstream water quality issues, it also impacts other community priorities. For example, many stormwater best management practices have positive impacts on the amount of trash in city streets and waterways, urban heat island effects, and local quality of life issues. If programs focus exclusively on watersheds and source water protection, the opportunity to leverage a variety of community priorities could be lost.

A green infrastructure approach creates linkages among environmental and natural resource protection priorities and between rural and urban communities. It has also been shown to reduce the costs associated with major stormwater and combined sewer overflow management efforts. The Low Impact Development Center, on behalf of the Natural Resource Defense Council, recently produced a report called *Rooftops to Rivers*, which highlighted the fiscal benefits of urban green infrastructure programs.[54] Implementing the types of programs highlighted in this report will probably not have a direct impact on drinking water resources in the Schuylkill watershed, but they will impact water resources, the quality of habitat areas, energy needs, and the development of livable communities. By taking a broader green infrastructure approach, the Network can leverage significant resources and accomplish multiple community priorities. The result is increased efficiency, and a greater return on investment.

Expand community participation and engagement. Effective financing strategies incorporate multiple financing sources, instruments, and institutions in a way that allows for sustainable, long-term implementation. There is no "silver bullet" solution for implementation. It will require the participation and commitment of each citizen in the basin and effective coordination among communities, institutions, and stakeholders throughout the region. In many ways, this is the greatest asset of the Network. It provides a structure for participation missing from other large-scale community restoration efforts.

Successful implementation requires the participation of the entire community and the integration of multiple institutions, organizations, and planning efforts. Perhaps no issue is more politically charged than that of money and the investment of scarce fiscal resources. Therefore, financing strategies require a community-based approach, incorporating all relevant stakeholder groups into the process. A strength of the Schuylkill Action Network is that it brings together multiple stakeholder groups in an integrated, cohesive way. This is an extremely important first step in protecting and restoring water resources because it focused on the role of community in the process.

Convene a state-level implementation task force. Protecting and restoring water resources is, or should be, a community priority, and success will eventually require the commitment of elected officials and local leadership at the highest levels. The Network has done a very effective job of engaging citizen activist groups, environmental organizations, and state and federal regulatory and agency partners. However, it is not clear the Network has been successful engaging and leveraging the participation of elected officials, both at the state and local level. Bottom-up citizen-based efforts are most successful when there is a concerted effort to engage leadership from the very beginning of the process. It is critical that the Network continue to engage state and local elected officials and work to have their endorsement of the process. From a financing perspective, success will require these very leaders to make a number of critical difficult decisions related to revenue and financing. If these leaders have not been engaged throughout the process, there is less chance that the necessary resources will be dedicated.

Focus on stormwater management and land use policy. As the source water assessment indicates, the greatest threat to water resources throughout the region is inadequate stormwater and wet weather management programs. Due to rapid population growth and land conversion, stormwater is becoming exponentially more difficult and expensive to manage. Compounding

[54] Christopher Kloss and Crystal Calarusse, "Rooftops to Rivers: Green Strategies for Controlling Stormwater and Combined Sewer Overflows" (Natural Resource Defense Council, June 2006).

the problem is the fact that the state government has made it relatively difficult for communities to implement aggressive management and financing programs. Therefore, from an efficiency perspective, it is important for the Network to focus its resources on influencing state law and regulations related to wet weather management issues. Specifically, the Network should lead the effort to encourage the state general assembly to pass enabling legislation allowing the formation and implementation of stormwater enterprise programs. Though these types of enterprise programs will not generate enough fees to finance much of the ultra-urban, capital infrastructure needs throughout the region, they will be particularly important in areas experience rapid growth and land conversion. If coupled with effective, enforced land use regulations, enterprise programs are often the most efficient, effective, and equitable way of maintaining critical water infrastructure systems.

Develop a Schuylkill River Watershed Trust. There are three key areas of financing capacity that must be addressed for the Network's goals, and the community's goals, to be realized. There must be sufficient, dedicated revenue sources; there must be the appropriate institutions to invest those resources; and there must be a concerted effort to invest those resources in a way that will reduce costs, improve efficiency, and ultimately maximize the community's return on investment. Addressing these financing priorities and capacity issues will continue to be the responsibility of the existing local, state, federal, and private financing institutions. However, there are significant financing gaps that must be addressed. The Environmental Finance Center recommends that the Network lead an effort to develop a Schuylkill River Watershed Trust (the Trust). The purpose of the Trust would be to finance green infrastructure and water resource protection and restoration projects across the watershed. Essentially, the role of the Trust would be to finance the implementation of the Network's goals, strategies, and recommended best management practices. The following section provides a few brief ideas and recommendations addressing how the Trust might be capitalized and governed, as well as a potential framework for decision-making and developing investment priorities.

Capitalizing the Trust. Our recommendation is that the Trust be capitalized by attaching a fee to every water extractor and every water discharger in the watershed. This means that not only will industry dischargers and extractors pay into the Trust, but also every residential drinking water and wastewater ratepayer in the region. Protecting natural resources, especially water resources, is something that benefits and impacts every citizen in the watershed, whether upstream or down stream. Everybody must pay in order to solve the problem. If every citizen (including corporate citizens) in the basin participates, the Trust would be capitalized with tens of millions of dollars per year.

The role of the Trust. The Trust's role would be to invest in the most efficient, cost effective strategies for protecting the region's water resources and green infrastructure. The Trust should have either the capacity to secure the revenue to fund innovative capital infrastructure projects, or it should be developed to work in partnership with other financing institutions such as PennVest and local water and wastewater authorities. The goal should not be to replace local and state financing institutions, but to expand the capacity of communities to fund and finance critical program and projects.

Potential governance structure. There are a number of different approaches and frameworks for developing an institution like the Trust.[55] However, there are a few critical issues that must be addressed when considering how the organization would be governed. First, the institution should be chartered or sanctioned by the state. The endorsement and leadership of state officials at the highest levels will be critical. Without it, the Trust would not have the capacity to effectively fulfill a financing role in the region. A good example of this type of relationship is the Chesapeake Bay Trust in Maryland.[56] Though the Trust would be charged with financing water resource programs, it would not necessarily need to be authorized to serve as a financing authority. The Trust could function much like Maryland's Chesapeake Restoration Fund program, where fees are collected by existing authorities and financing institutions.[57]

The advantages of developing the Schuylkill Watershed Trust. Ultimately, the purpose of a regional financing entity like the proposed Trust is to improve the capacity of local and state financing efforts by filling critical financing institutional gaps. One of the most significant of these gaps in Pennsylvania results from the municipal governance structure. In the Schuylkill watershed alone there are dozens of incorporated municipalities, each with their own priorities, levels of capacity, and laws and regulations. As a result, restoration and protection efforts are often scattered and uncoordinated. In addition, there are extraordinary losses of efficiency when financing cannot be implemented on a regional or unified basis. The Schuylkill Watershed Trust would have the capacity to coordinate municipal and state financing efforts and apply fiscal

[55] The Environmental Finance Center facilitated and led a process to provide recommendations for developing an inter-jurisdictional financing institution to support the restoration of the Chesapeake Bay. A white paper report outlining the Chesapeake Bay Financing Authority Committee's findings is available on the EFC web site at http://www.efc.umd.edu.

[56] The Chesapeake Bay Trust (CBT) was established by Maryland's General Assembly in 1985 as a private, nonprofit organization to develop greater public awareness and participation in the protection and restoration of the Bay and its tributaries. CBT does this through a variety of grant programs that support nonprofit organizations, civic and community groups, schools and public agencies in their Bay-related efforts. Approximately 90% of CBT's funding is devoted to on-the-ground restoration, protection, and education programs. The majority of this funding comes from two primary sources: a tax check-off program and a license plate program. In 1988, the General Assembly established a voluntary donation check-off on state tax forms for the Chesapeake Bay and Endangered Species Fund. These donations are split equally between CBT and the Department of Natural Resources Wildlife and Heritage Program. CBT revenues from the tax check-off program are approximately $550,000 annually, with around 2% of the state's taxpayers participating. In 1990, the *Treasure the Chesapeake*, also known as the Bay plate, license plate program was legislatively established. This program operates as a revenue sharing program between CBT and the Maryland Motor Vehicle Administration (MVA). CBT receives $12 from the one-time $20 purchase fee for the plate and the remaining funds go to MVA. By the end of the decade, revenues from the sale of these commemorative plates had brought in $9.8 million. By 2005, approximately 10% of vehicles in the state display the Bay plate, and over $800,000 was collected from the program that year. For additional information on the Trust, visit http://www.cbtrust.org.

[57] There are three ways that the Trust could be capitalized. It could be given the authority to levy taxes or fees (clearly there would be significant state legal issues to consider), or it could be capitalized through revenue streams, such as fees, collected by other institutions. An example is the Chesapeake Bay Restoration Fund in Maryland. With this program, a monthly fee of $2.50 is charged on the individual sewer bills to those served by a wastewater treatment plant (commercial operations are charged on a per equivalent dwelling unit scale based on usage). Septic system users pay a $30 annual fee. The state distributes the funds to the utilities to upgrade wastewater treatment plants to reduce nitrogen discharge, which causes algae blooms that harm fish, crabs, native plants, and other aquatic life. The revenues from septic tank users are used to upgrade or replace failing septic systems and to provide financial assistance to farmers to help plant cover crops to prevent nutrient runoff from agricultural land. For additional information, see http://www.mde.state.md.us/Water/CBWRF/index.asp.

resources where they are critically needed, regardless of geopolitical boundaries. Other advantages include:

- The funds would focus on the most intractable, difficult financing issues such as land protection, AMD, and wildcat sewer systems. In effect, the Trust would fill a critical institutional gap within the watershed; and,
- The funds generated and invested by the Trust would result in potentially significant cost savings to communities throughout the watershed as a result of reducing the need for significant infrastructure upgrades.

Potential barriers and challenges. Establishing the Trust would require a significant amount of coordination and overcoming significant implementation barriers. For example, political resistance would most likely be significant, especially from the drinking water and wastewater systems. It is very difficult to impose and implement significant fee-based programs for any purpose, water resource protection being no exception. The fact that the Trust would be capitalized through multiple water systems would require even more political action and energy. Implementing a program like this within multiple institutions will be difficult, and may actually require state legislation and participation. Finally, the Trust would need to be established as an independent institution. However, it may be necessary to finance best management practices at public institutions. This will almost certainly present a number of legal issues and barriers that will need to be addressed.

To help meet these challenges, it is our recommendation that the Network lead efforts to develop a strategy for implementing the Trust. The first step would be to convene a task force, as recommended above, and have the task force begin its work by conducting a feasibility study for implementing the Trust concept. Again, the task force should be endorsed and supported by all levels of government, and it should focus on outlining the appropriate structure, decision-making criteria, legal barriers, and organizational mission.

Project Team

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Ms. Youngblood currently works as a Program Manager for the Environmental Finance Center (EFC) at the University of Maryland. Prior to the Environmental Finance Center, she worked for the Environmental Change and Security Program at the Woodrow Wilson International Center for Scholars where she managed a Carnegie-funded initiative on community based water and sanitation projects. Previously, Ms. Youngblood also provided programmatic support for political party development programs and managed a research project on party finance at the National Democratic Institute for International Affairs; and was Regional Coordinator for Africa & Middle East programs at an international environmental organization called Earth Day Network. Ms. Youngblood holds a BA in International Relations with a focus on African political economy from Tufts University and has advanced Spanish language skills.

Dan Nees, Director
Environmental Finance Center
Mr. Nees has been with the Environmental Finance Center for six years, and assumed the role of Director in January 2005. Mr. Nees has worked with communities throughout the Mid-Atlantic region in their efforts to implement and finance environmental and sustainable development initiatives. His work has focused on developing and building coalitions of diverse interests groups and directing them towards common financing and implementation goals. Additional experience includes serving as Project Manager of Corporate Programs at The Nature Conservancy and Manager of Alternative Marketing at U.S. News and World Report. Mr. Nees holds a B.A. in Economics, a Master of Environmental Policy, and a Master of Business Administration, all from the University of Maryland, College Park.

Michael Curley, Executive Director
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Mr. Curley is the founder and executive director of the International Center for Environmental Finance, which is funded with a $3 million grant from the U.S. Environmental Protection Agency (USEPA). For several years, he also served as the senior financial advisor to the Office of International Affairs at USEPA. Mr. Curley's work has focused on the former Soviet Union, Central America and Asia to develop financial mechanisms for funding infrastructure projects. Throughout his work, he advised many governments and international organizations on finance in over 25 countries across the globe, including the World Bank, and the North Atlantic Treaty Organization (NATO). He also served as a Senior Lecturer at the Johns Hopkins University on International Project Finance and also as an Adjunct Professor of Banking and Finance at New York University where he taught Venture Capital as well as Capital Markets & Investment Banking. Mr. Curley holds a Juris Doctor from the University at Buffalo Law School in Buffalo, NY and a Bachelor's degree from Georgetown University in Washington, DC.

William Matuszeski, Consultant
Mr. Matuszeski is the former Director of the Chesapeake Bay Program from November 1991 until April 2001. The Chesapeake Bay Program is the premier watershed restoration effort in the United States, and is recognized world-wide for its clear goals, measurable achievements, comprehensive approach to such complex problems as air pollution deposition and land use change, and use of computer models to test management options. In recognition of his role in these achievements, Mr. Matuszeski was the 2001 recipient of the Environmental Protection

Agency's highest honor for distinguished service, the Lee Thomas Award. Since retiring in 2001, he has served as a consultant to regional efforts to manage, preserve and restore watersheds, including the Hudson River Valley, New York Harbor, Long Island Sound, Narragansett Bay, and the Sea of Cortez in Mexico. He recently co-authored a report of the Chesapeake Bay Commission on the most cost-effective measures to restore the Bay, and worked with the United Nations on standards for coastal reconstruction after the Asian tsunami. Mr. Matuszeski received his undergraduate degree in government from the University of Wisconsin and his law degree from Harvard with a specialization in land law. After law school, he served for two years in the Peace Corps in Venezuela, working on urban development problems for the city government in Valencia.