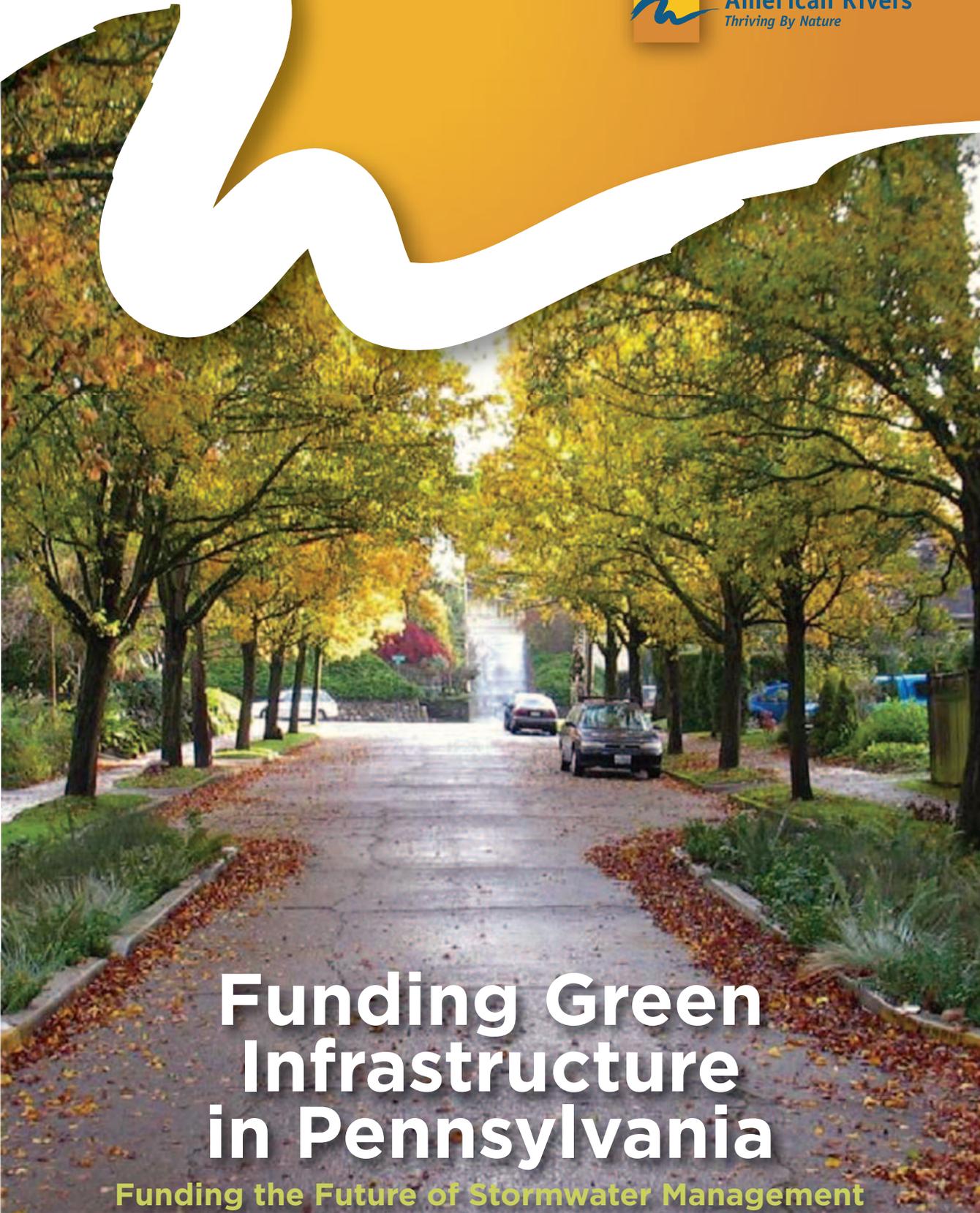




**American Rivers**  
*Thriving By Nature*



# Funding Green Infrastructure in Pennsylvania

**Funding the Future of Stormwater Management**



**Written by Liz Garland**  
**With support from the William Penn Foundation**

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# GREEN INFRASTRUCTURE IN PENNSYLVANIA: Funding the Future of Stormwater Management

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## EXECUTIVE SUMMARY

A twist on a familiar adage amongst water managers is “when it rains, it drains.” While not unique to Pennsylvania, in suburban and urban municipalities, centuries of strong growth, including recent decades of sprawl, have transformed much of the state’s natural land cover into extensive impervious surface. As a result, instead of soaking into soils and groundwater, stormwater drains directly into rivers and streams contributing to—and often exacerbating—flooding and pollution.

The ideal approach to resolving the adverse impacts of stormwater would be to return the landscape to its natural cover. A highly cost-effective, efficient, and viable solution is to adopt “green” infrastructure practices that protect, restore, and replicate nature’s treatment of stormwater. Green infrastructure includes low-impact development practices at new and re-developing sites, and the incorporation of features such as rain barrels, green roofs, and permeable pave-

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ment on already-developed sites. Green infrastructure is becoming widely understood and accepted, and is being implemented on the ground in cities across the nation, including Pittsburgh and Philadelphia.

The challenge to broader implementation in smaller municipalities throughout the Commonwealth is ensuring that regulatory, management, and funding institutions work in concert to promote the use of green infrastructure. To begin with, Pennsylvania is challenged by historical patterns of funding water management that have prioritized wastewater treatment and drinking water delivery over stormwater management. Traditionally, funding also has favored hard structural solutions to management (known as “gray” infrastructure) rather than nonstructural or “green” practices that address the problems associated with runoff at its source. Further, regulation of stormwater management has failed to sufficiently integrate greener solutions and to promote nonstructural practices in the management of Pennsylvania’s water resources.

The unfortunate result is that Pennsylvania has received a failing grade for its management of stormwater. In 2009, the Chesapeake Stormwater Network ranked Pennsylvania *last* of five Chesapeake Bay states on its Baywide Stormwater Scorecard. With an overall grade of “D” for implementing a stormwater program that meaningfully protects and restores the Bay, Pennsylvania received an “F” with regard to its funding of stormwater management needs to address the 21<sup>st</sup> century challenges posed by aging and deteriorating infrastructure, increasing demands on water use, and impacts of a changing climate.<sup>1</sup>

Today, Pennsylvania has an unprecedented and timely opportunity to transform its water infrastruc-

ture. Following federal guidance, state regulations are being revised to incorporate greener approaches to stormwater management. Also, suggestions to adopt innovative management practices, including green infrastructure and conservation measures, are evolving from stakeholder discussions. Finally, funding institutions are quickly adapting to finance green infrastructure, catalyzed in part by the passage of the American Recovery and Reinvestment Act of 2009 (ARRA) which includes investments in green infrastructure and water efficiency advocated for by American Rivers. In 2009, \$44.6 million in federal stimulus funds directed toward Pennsylvania for water infrastructure has leveraged more than \$66 million in spending the state describes as “green.”<sup>2</sup>

It is imperative to seize this chance to make progressive and institutional “green” investments to avert “pouring money down the drain.” Pennsylvania’s rivers and communities depend upon clean water and require a swift remedy to current infrastructure woes. “Green” solutions have the added benefit of facilitating the resilience rooted in nature that communities need to adapt to the impacts of climate change on vital freshwater resources.

Towards those ends, American Rivers has investigated the capacity of Pennsylvania’s funding institutions to support efficient and cost-effective green infrastructure practices to enhance sustainable water management over the long term. Our findings highlight several recommendations for formalizing funding for green infrastructure that will help Pennsylvania municipalities achieve clean and abundant supplies of fresh water for healthy communities and future generations.

**Recommendations for formalizing funding for green infrastructure that will help Pennsylvania municipalities achieve clean and abundant supplies of fresh water for healthy communities and future generations include:**

- 1. Foster a collaborative relationship and consistent approach amongst stormwater management planning, regulation, and funding institutions to promote and advance the adoption and implementation of green practices;**
- 2. Establish principles for investment in green solutions for stormwater management that will guide funders and applicants toward natural infrastructure alternatives;**
- 3. Diversify funding sources for Pennsylvania’s water infrastructure needs to maximize the benefits of green practices instead of, or in conjunction with, traditional hard infrastructure; and**
- 4. Improve outreach so that those responsible for local implementation of stormwater management practices know where to find technical and financial resources that support sustainable green practices.**

These recommendations will facilitate efficient and cost-effective green practices to address Pennsylvania’s stormwater management challenges. The results will yield benefits in the form of reduced tertiary treatment costs, decreased flood damages, and healthier ecosystems and communities throughout Pennsylvania that are also better prepared to adapt to a changing climate.



## INTRODUCTION

### Background: The Mechanics of Stormwater

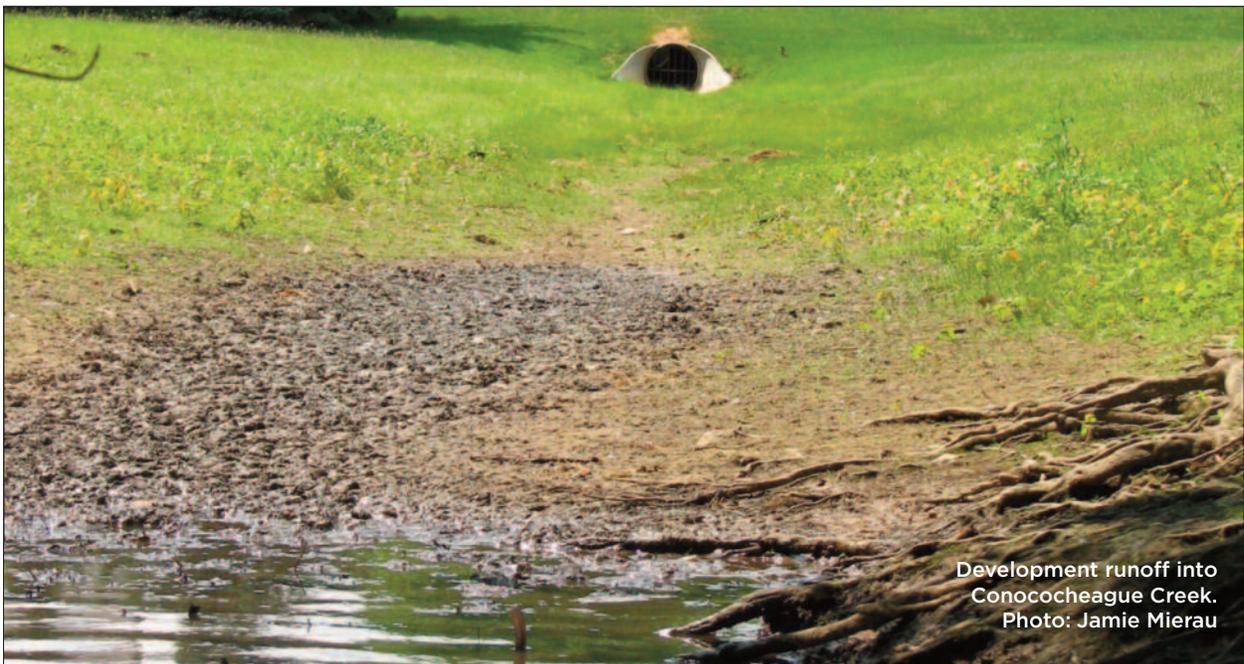
When land is covered with a natural mix of grasses, plants, and trees, on average only 10% of rainfall will run off the surface and flow directly into a stream or river. The remainder will evapotranspire or infiltrate the ground, nourishing plant life and restoring ground water levels. But when natural land cover is developed, impervious surfaces such as rooftops, pavements, and sidewalks will change the hydrologic balance. When impervious cover exceeds 75% of a land area, as it does in most urban communities, infiltration is reduced and surface runoff will deliver as much as 55% of rain directly to rivers and streams.<sup>3</sup>

Once development occurs, precipitation that previously soaked into the ground runs off pavement and other hard surfaces, carrying contaminants, including oil, grease, lawn chemicals, heavy metals, hydrocar-

bons (combustion by-products), bacteria, and sediment. These pollutants can harm fish, wildlife, and native vegetation. Community drinking water supply, as well as recreational activity, can become unsafe.

In highly urbanized areas, development and increased impervious surfaces strongly correlate to increases in flooding. Highly impervious urban areas can generate five times the runoff that results from similarly-sized forested land. Floods regularly increase in frequency and severity with the expansion of impervious surfaces.

Flooding and high-volume stormwater flows result in streambed and bank erosion, causing habitat loss and threatening infrastructure. High-volume flows and erosion also mobilize sediment, which buries aquatic habitats, reduces water clarity, increases drinking water treatment costs, and delivers excessive phosphorus and



Development runoff into Conococheague Creek.  
Photo: Jamie Mierau

nitrogen into rivers, streams, and lakes. Additionally, erosion and high-velocity, high-volume flows expose and undermine infrastructure such as bridge columns, sewer and water pipes, pier supports, roadways, and historic sites. Further, flooding costs billions of dollars each year in the United States. In the near future, climate change will bring more intense and more frequent storms, magnifying the burdens of flooding.

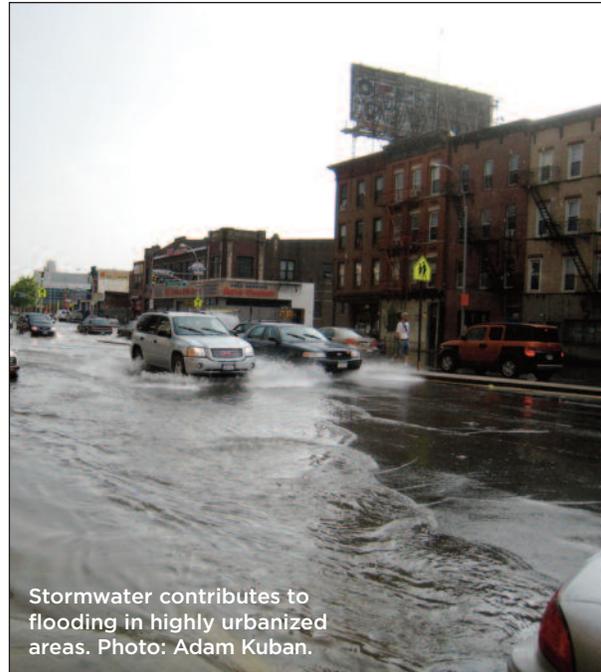
## Pennsylvania's Stormwater Challenge

Only an approximate 20% of waterways in the eastern U.S. are healthy, and stormwater is the second leading cause of impairment (streams and rivers failing to meet clean water standards).<sup>4</sup> In Pennsylvania, 4,000 of the state's river miles are impaired by stormwater<sup>5</sup> and siltation contributes to 51% of all impaired river miles.<sup>6</sup> Stormwater contributes pollutants, such as sedimentation, unhealthy bacteria levels, deposition of metals, and excessive nutrients such as phosphorus and nitrogen.<sup>7</sup> Stormwater also contributes to Combined Sewer Overflow (CSO) violations, which are expansive and costly problems for Pennsylvania's mid- and large-size cities.

As an example, the Susquehanna River basin, covering approximately one-third of Pennsylvania, is the Chesapeake Bay's single largest watershed. Stormwater runoff in the basin contributes 11% of the nitrogen and 15% of the phosphorus polluting the Bay; a major issue because nutrient pollution reduction is the foremost challenge to Bay clean-up efforts.<sup>8</sup> Likewise, throughout Pennsylvania, polluted stormwater runoff is one of the largest challenges for water resource managers.

## Green Infrastructure Solutions

Green infrastructure is quickly becoming accepted as an appropriate and, even more important, a priority solution to water resource management needs across the country. Broadly defined as an approach to water management that controls the volume and velocity of stormwater runoff at its source; green infrastructure reduces the occurrences of sewer overflows and minimizes flooding.

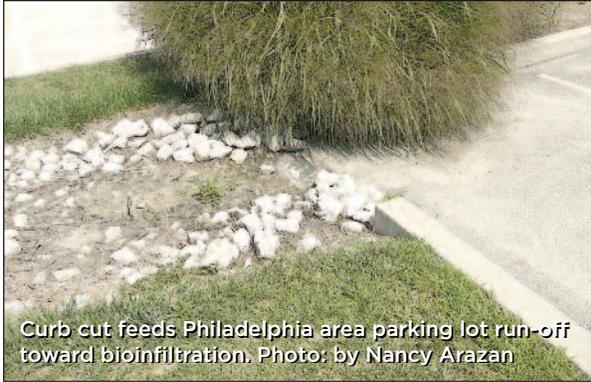


Stormwater contributes to flooding in highly urbanized areas. Photo: Adam Kuban.

Green infrastructure protects existing floodplains, restores floodplain and wetland functions, and mimics natural features by retaining and filtering runoff, reducing the need for costly new wastewater treatment plants, flood control structures, and the extensive network of pipes to direct stormwater.

It accomplishes these goals by protecting, restoring, and essentially replicating the natural landscape and corresponding hydrology.<sup>9</sup> Examples of green infrastructure include vegetated river buffers, bank stabilization, tree plantings, permeable pavement in parking lots and driveways, vegetated roof surfaces or "green roofs," and catchments such as rain barrels connected to downspouts on buildings.

These practices capitalize on natural solutions to al-



leviate stormwater pollution and flooding. They are generally less expensive and more effective over the long term than traditional hard infrastructure solutions. Green infrastructure protects existing floodplains, restores floodplain and wetland functions, and mimics natural features by retaining and filtering runoff, reducing the need for costly new wastewater treatment plants, flood control structures, and the extensive network of pipes to direct stormwater. For instance, vegetated rooftops can capture a typical one-inch rain and intercept pollutants, minimizing the load on urban water infrastructure systems.<sup>10</sup>

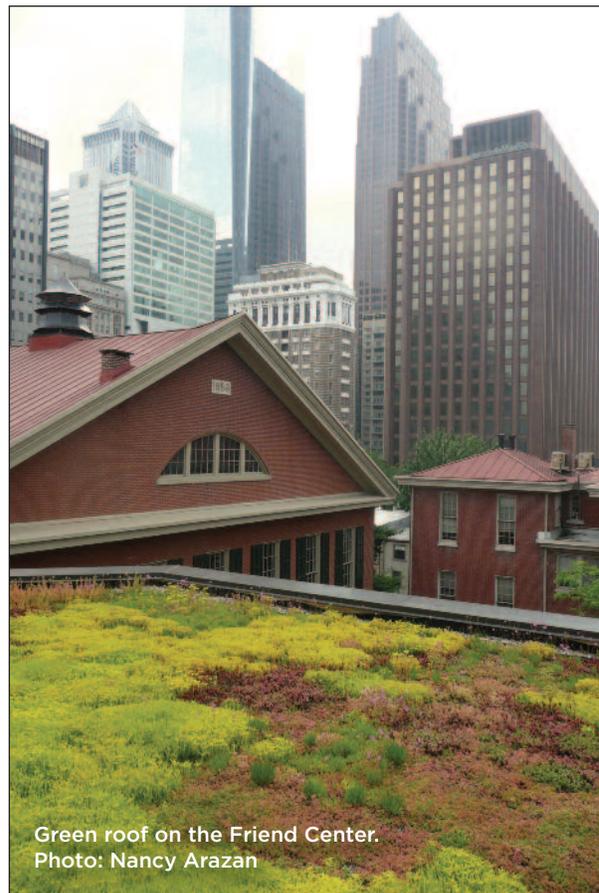
Investments in green infrastructure also can create jobs. Developing and installing vegetated cover for as little as 1% of large roof surfaces in all medium and large U.S. cities would generate greater than 190,000 jobs,<sup>11</sup> while reducing overloaded sewer infrastructure, flooding impacts, and polluted runoff.

In addition, recent studies support the theory that green infrastructure investments provide greater economic benefit than traditional hard infrastructure. An August 2009 report prepared for Philadelphia's Office of Watersheds assigned \$122 million in benefit to traditional, hard infrastructure approaches to CSO management compared to \$2,846.4 million of benefit for approaches that incorporated solutions using green infrastructure.<sup>12</sup>

Cities around the country are reaping the benefits of green infrastructure practices.<sup>13</sup> Philadelphia, Chicago, Portland, Seattle, Milwaukee, and other cities are

stimulating interest in these cost-effective techniques that manage stormwater on-site, reduce the need for expensive, hard infrastructure projects and stretch scarce budget dollars. Many localities have developed strong municipal regulation supporting green infrastructure to manage stormwater. Both North Carolina and New Jersey created stormwater permits with green infrastructure requirements to mitigate the impacts of land-disturbing activity. And, the Ventura County, California Municipal Separate Storm Sewer System (MS4) permit encourages green infrastructure by reducing the allowable area of impervious surface to less than 5% of any new or redevelopment site.<sup>14</sup>

In Pennsylvania, Philadelphia is leading the way in integrating green infrastructure into city planning to reduce combined sewer overflows and stormwater pollution and increase green space. The city has launched a bold plan, *Greenworks*, to utilize a broad array of energy efficiencies, conservation practices, and



environmental and economic improvements, which include the incorporation of green infrastructure to combat the costs of treating water impaired by stormwater. “Green infrastructure solutions are emerging as a way for the city to manage its water, primarily stormwater. ‘Back to the Future’ technologies like green roofs, undeveloped land, rain gardens and tree plantings acknowledge the natural links between land and water that can provide Philadelphia with social benefits that so called ‘grey’ infrastructure cannot.”<sup>15</sup>

Green infrastructure features such as bio-retention, swales, wetlands, forest buffers, and vegetated strips have been implemented to reduce pollution and benefit municipalities responsible for pollution reduction programs, particularly within the Chesapeake Bay watershed.

Bolstered by the recent economic analysis supporting green infrastructure practices within CSO management, in September 2009 Philadelphia submitted a Long-Term Control Plan to the U.S. Environmental Protection Agency (EPA) that proposed extensive green infrastructure implementation.<sup>16</sup> Similarly, the Pittsburgh suburb of East Liberty has determined that green infrastructure practices such as pervious pavement, street tree plantings, and infiltration beds are cost-effective means to reach the goal of 85% capture of CSOs.<sup>17</sup>

Green infrastructure features such as bioretention, swales, wetlands, forest buffers, and vegetated strips have been implemented to reduce pollution and benefit municipalities responsible for pollution reduction programs, particularly within the Chesapeake Bay watershed. These features improve nitrogen loads ranging from 10% to 68% and total phosphorus reductions from 20% to 63%.<sup>18</sup> The Susquehanna River Basin Commission demonstrated 48%-81% reduction in sedimentation by employing green infrastructure practices. Other studies have quantified the reduction of metals such as copper, zinc, and lead by as much as 95%-97%.<sup>19</sup>

EPA’s Green Infrastructure Initiative<sup>20</sup> and formal recognition by EPA of the validity of using green infrastructure techniques to meet regulatory requirements for CSOs and stormwater management under the Clean Water Act (CWA) are further fueling this surge in interest from cities, towns, and counties across the nation.<sup>21</sup> Highlighting the agency’s support for change, EPA refers to traditional hard infrastructure approaches as a “mid-twentieth century approach to stormwater management to dispose of stormwater as quickly as possible using engineered systems of curbs, gutter, pipes, and open channels, resulting in unexpected consequences for water quality.”<sup>22</sup>



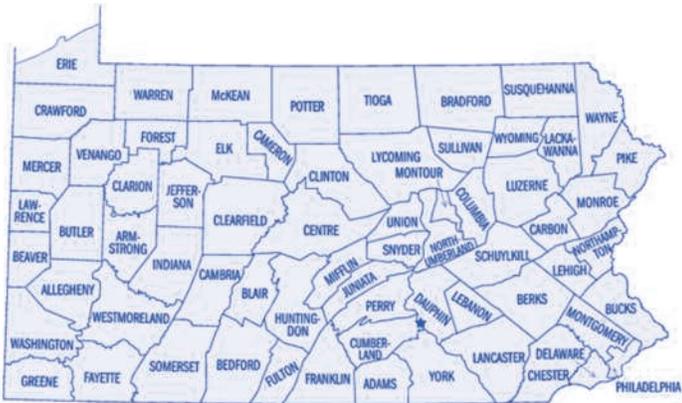
## THE INSTITUTIONAL FRAMEWORK FOR STORMWATER MANAGEMENT

Implementing sustainable stormwater projects is contingent upon strong regulatory, planning, and oversight agencies and supporting finance mechanisms, which all vary from state to state. In Pennsylvania, the sheer numbers of localities involved in stormwater management—67 county governments and 2,567 municipalities—complicate the state’s task. These municipalities often share water resources with multiple bordering localities and yet must compete for technical and funding resources. Consequently, Pennsylvania is challenged to deliver effective regulation, management, and funding to the communities responsible for ensuring that local solutions result in clean water for healthy communities.

must work in unison to enable Pennsylvania’s many municipalities to adopt progressively greener approaches to address stormwater runoff problems.

The foundation of most clean water regulation is the CWA, which seeks to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters.”<sup>23</sup> Stormwater regulation evolved slowly under the CWA after courts and Congress rejected EPA’s efforts to exempt stormwater runoff from coverage under regulations governing point source discharges. By 1992 the federal stormwater program addressed industrial and large municipal stormwater discharges. Construction sites and small “Phase II” municipal (urban areas typically characterized by population totals between 10,000 and 100,000 people and population densities of at least 1,000 people per square mile) discharges were added to regulation in 1999. The first Phase II permits were issued in March 2003<sup>24</sup> and are now being revised to reflect developments in stormwater control. These federal requirements are largely implemented by state agencies.

Similar to federal regulation, Pennsylvania’s implementation of stormwater regulation has developed slowly. The Clean Streams Law authorizes the Pennsylvania Department of Environmental Protection (DEP) to require municipal drinking water providers and entities discharging sewage to maintain or improve necessary water infrastructure.<sup>25</sup> As a complement to the Clean Streams Law, stormwater management is addressed by the Stormwater Management Act of 1978 (known as Act 167).<sup>26</sup> Act 167 requires counties to develop stormwater management plans and submit updates every five years to DEP. After more than 30 years, some counties have yet to submit first plans.



### Regulation, Policy, and Planning

While funding is central to promoting smart stormwater management, a combination of regulation, policy, and planning requirements are also motivating factors for most municipalities to address polluted stormwater runoff. On-the-ground solutions are implemented locally but are driven by a policy structure initiated at the federal level and administered at the state level. These drivers currently provide a fragmented framework for stormwater management. Regulation, policy, planning, and funding

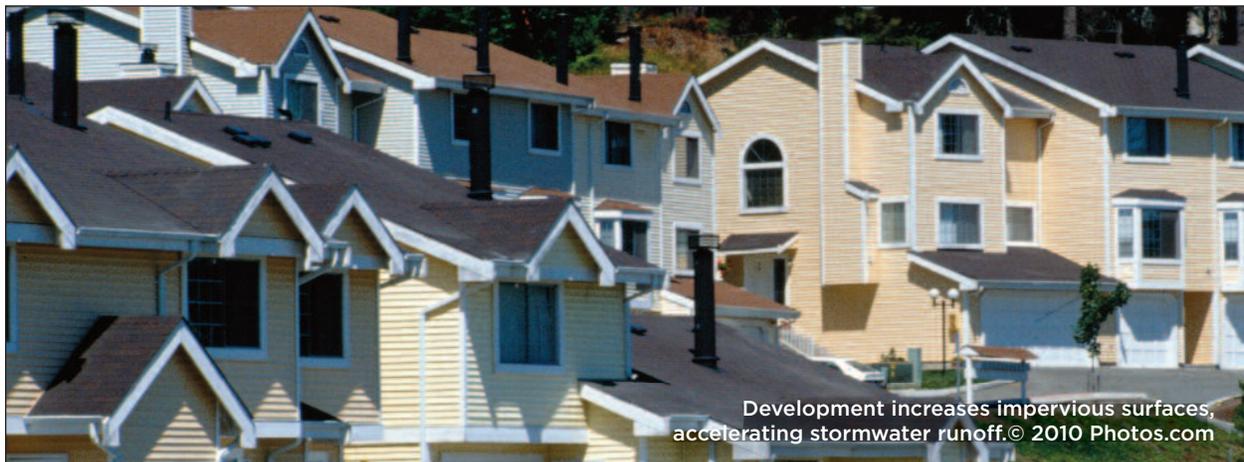
To accelerate stormwater planning, DEP finalized the Comprehensive Stormwater Management Policy in September 2002 to assert existing authority and integrate all stormwater management programs, including construction activity runoff, industrial permitting, and municipal discharges. The policy emphasized “the reduction of stormwater runoff generated by development and other activities by encouraging the minimization of impervious cover, use of low impact development designs, and the use of innovative stormwater best management practices (BMPs) that provide infiltration, water quality treatment, and otherwise more effectively manage the volume and rate of stormwater discharges.”<sup>27</sup>

While an important policy goal, it has unfortunately not been applied to specific regulatory programs. In December 2006, DEP completed the Pennsylvania Stormwater Best Management Practices Manual (BMP Manual)<sup>28</sup> that guides the Comprehensive Stormwater Management Policy with specific prescriptive practices. Yet this manual is not fully integrated in Pennsylvania’s statewide stormwater permits, including the draft revised National Pollution Discharge Elimination System Stormwater Discharges from Small Municipal Separate Storm Sewer Systems General Permit (PAG-13).<sup>29</sup> Until regulatory frameworks are strengthened to fully integrate the principles of green infrastructure widespread, improvements will be limited.

Municipalities are authorized to perform land use and limited water resource planning.<sup>30</sup> Pennsylvania’s

stormwater program requires municipal ordinances that reflect county stormwater plans developed under Act 167. To assist localities, DEP drafted a model ordinance for stormwater management in 2008.<sup>31</sup> The model ordinance offers guidance to municipalities responsible for implementing sound stormwater management and includes green infrastructure principles, yet it has never been finalized. Until DEP fully endorses the model ordinance, municipalities cannot be motivated to enforce its green infrastructure principles.

Since 2005, state supported activity was supposed to adhere to the Keystone Principles and Criteria for Growth, Investment and Resource Conservation, which should align well with green infrastructure.<sup>32</sup> The Keystone principles are: redevelopment first, efficient infrastructure, sustainability, and environmental enhancement and restoration through preferential criteria. The Keystone criteria include: improvement of existing water and sewer capacity while designing new water, storm, and sewer facilities utilizing best management practices that emphasize recharge and infiltration and the use of permeable surfaces. Additional preferential criteria suggest green building standards and development practices that incorporate natural resource features. While these strong principles could broadly influence the adoption of green infrastructure practices within water management, implementation of the principles are left to the discretion of each agency without specific requirements to emphasize the environmental priorities.

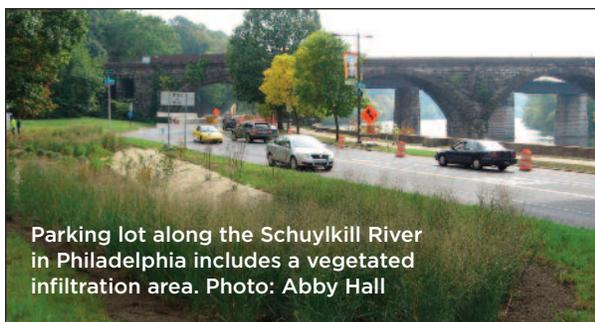


Similar to federal programs, the state's seemingly progressive policies are rarely institutionalized within state regulation and municipal practice. Taxpayers for Common Sense described Pennsylvania's water infrastructure regulation as "well intended, but fragmented and often ineffective."<sup>33</sup> One recommendation for effective water resource management is to require implementation of the best pieces of Pennsylvania policy such as the BMP Manual, draft model ordinance, and Keystone Principles. Collectively, these promote effective practices including green infrastructure, yet each is currently applied inadequately. Each must be firmly established within regulatory and funding institutions to ensure municipalities comply with and prioritize the state's smart management policies.

### Funding for Green Infrastructure

The gap between existing and needed funds for wastewater and drinking water infrastructure capital expenses in Pennsylvania has been estimated at \$36.5 billion over the next 20 years,<sup>34</sup> complementing the 2009 report by the American Society of Civil Engineers that rated the nation's wastewater infrastructure their lowest grade of D-.<sup>35</sup>

The need to reinvest in repairing and replacing the nation's water infrastructure is significant, but the approach to funding water infrastructure must wisely adopt a definition that encompasses the built and natural environment.<sup>36</sup> As described earlier, to protect clean and safe water for the future, any water infrastructure funding should encourage smart, 21<sup>st</sup> century approaches, such as green infrastructure and water efficiency, to enhance and extend the life of traditional infrastructure. Successful institutionalization of green infrastruc-



Parking lot along the Schuylkill River in Philadelphia includes a vegetated infiltration area. Photo: Abby Hall

ture practices within state policy and regulation is a critical accompaniment to the necessary financial support. Both federal and state funding programs can provide money for sustainable stormwater practices. Unfortunately, many of these sources are underutilized because the trend toward greener practices occurring across the nation and heralded by EPA has not been institutionalized in Pennsylvania. To ensure sustainable water management, reduce the funding gap, and improve the nation's infrastructure grade, funding priorities must be clearly redirected to fund sustainable infrastructure. Recommendations for change are included with the analysis of each funding source (see Agencies and Programs Funding Stormwater Management, p. 12) and at the end of this report.

### *Sustainable Infrastructure Funding in Pennsylvania*

The recommendations of recent studies and policy statements recognize the need to transform Pennsylvania's water infrastructure; however, corresponding actions required to achieve these ideals are lacking. This shortcoming is illustrated by Governor Rendell's well-intended leadership in Building America's Future and his introduction of "Re-invest in Pennsylvania's Infrastructure," two efforts that missed the opportunity to advance sustainable water infrastructure.

Building America's Future is a coalition that advocates for increased federal funding to rebuild aging infrastructure, including water infrastructure,<sup>37</sup> but has not mobilized efforts to leverage smarter, sustainable, green infrastructure practices for water management. The initiative, Re-invest in Pennsylvania's Infrastructure, spearheaded two appropriation bills in 2008 totaling \$1.2 billion for infrastructure improvements,<sup>38</sup> including water projects, without prioritizing innovative projects that demonstrate sustainable management. Of the \$800 million allocated to the Commonwealth Financing Authority, stormwater projects received only \$15.5 million for stormwater separation from sewer systems.<sup>39</sup> Governor Rendell's commitment to infrastructure investment instead focused primarily on transportation or traditional water infrastructure, including

structural flood protection, wastewater treatment, and drinking water delivery.

To his credit, the Governor also created a Sustainable Water Infrastructure Task Force and directed the Task Force to report financing solutions including “recommendations for more efficient water infrastructure management that could gradually eliminate the gap” between needs and resources. From the final report, the recommendations most relevant to sustainable water infrastructure are:<sup>40</sup>

1. *Asset management* requirements because few water management infrastructure facilities have sufficiently planned for full operation and maintenance costs. Asset management would require an assessment of facility condition, a plan for upgrades or repairs, and creation of a fund that adequately budgets for asset needs, including CSO compliance and stormwater management to minimize facility burdens.
2. *Efficient operations* to reduce wasteful management of water within the system. The use of innovative technologies is encouraged. These include: water reuse, conservation measures, inflow, and infiltration reduction and energy audits.
3. *Regionalization or right-sizing* acknowledges that the municipal structure may not be the most cost effective for managing water resources that cross political boundaries. Thus, the Task Force recommended flexibility to permit decentralized or on-site water management systems, and aggregation of resources amongst multiple municipalities within a region. Such flexibility would allow consolidation or elimination of non-viable or less efficient systems, and would offer a variety of incentives for right-sizing. Although right-sizing is traditionally directed at wastewater management, the Task Force advocated for multi-municipal approaches to stormwater and permitting of stormwater authorities.

4. *Maximization of non-structural and conservation measures.* The Task Force recognized that encouraging or even mandating the use of non-structural solutions would reduce the overall cost of maintaining and upgrading water infrastructure. **Principally the Task Force recommended increased focus on stormwater management and the use of green infrastructure.**

Although the Task Force implicitly supported green infrastructure as part of the solution toward sustainable water resource management practices within each of the above suggestions, it failed to list specific incentives or funding practices to implement green infrastructure. Instead, the Task Force concluded that a broad and diverse array of funding sources and approaches would be necessary to meet Pennsylvania’s water infrastructure management goals. Task Force suggestions must be detailed and supported by legislation so that communities can be assured affordable and sufficient clean water in the future.



Rain barrel installed in Delaware Co., PA. Photo by Debbie Lamborn, CAADC

Another state effort that may be influential in moving the state towards innovative water management is the State Water Plan, adopted in 2008 by DEP as the result of a five-year study to assess and protect critical water supply throughout the Commonwealth.<sup>41</sup> The plan has no regulatory capacity but can provide guidance to resource management agencies about the need for innovative and green practices to manage critical water resources.

The Commonwealth is at an important juncture, poised to move from theory to reality by building on progress made in spending stimulus dollars and incorporating into practice the principles found in the collective of policy studies.

Additionally, Pennsylvania can examine the independent efforts of communities across the state where green infrastructure has been valued and adopted. This includes the Greenworks model, Philadelphia's assessments of green infrastructure benefits, and corresponding planning proposals.

On the federal level, the strongest driver for green infrastructure is the new funding pool for green infrastructure and water efficiency within the State Revolving Fund (SRF) administered by the Pennsylvania Infrastructure Investment Authority (PENNVEST) and established in the American Recovery and Reinvestment Act of 2009.<sup>42</sup> Described in detail below, this funding has forced the state to seriously solicit green projects and consider how best to evaluate and support such projects over the long term. PENNVEST specifically adopted the priorities defined in the Sustainable Water Infrastructure Task Force Report within its ranking criteria for this Green Project Reserve spending of federal stimulus funds awarded in July 2009.<sup>43</sup>

The Commonwealth is at an important juncture, poised to move from theory to reality by building on progress made in spending stimulus dollars and incorporating into practice the principles found in the collective of policy studies. The following analysis of available funding sources provides a roadmap toward realizing sustainable practices by investigating the ability of state programs to incorporate necessary changes to funding approaches for water management that will carry Pennsylvania through fiscal crisis and enable the state's water infrastructure to adapt to the impacts of climate change.



## AGENCIES AND PROGRAMS FUNDING STORMWATER MANAGEMENT IN PENNSYLVANIA

Although there are a variety of state funding sources, Pennsylvania's water supply, wastewater treatment, and stormwater infrastructure continues to be funded by significant federal dollars administered through state agencies. While the State Revolving Funds (SRF), administered by PENNVEST, are the largest single source of water infrastructure funding,<sup>44</sup> PENNVEST administers other sources and several other agencies are responsible for smaller investment programs in Pennsylvania's water management systems. These include the Department of Community and Economic Development (DCED), Department of Conservation and Natural Resources (DCNR), DEP, and Rural Development under the U.S. Department of Agriculture (RUS-USDA). Each of these programs is described in greater depth below. Collectively, they remain the most viable solutions to close the gap between available financial resources and infrastructure needs, yet each requires smarter strategies to be successful, including greener investments.

### **PENNVEST**

Through administration of the SRF and other sources, PENNVEST makes available the largest amount of money for water infrastructure in Pennsylvania. Wastewater treatment plants are the primary beneficiaries of this money. While stormwater projects are eligible for funding, a summary of all projects awarded since authorization of PENNVEST reveals that less than two percent have gone to stormwater specific projects.<sup>45</sup> Even fewer of the stormwater projects that have been funded could be defined as "green." Fortunately, signs of change are evident as a result of the requirement placed on states to set aside green investments in order to receive stimulus funds. In April 2009, PENNVEST awarded a green loan of \$30 million to Philadelphia

for citywide sustainable infrastructure developments.<sup>46</sup> PENNVEST must build on these first steps and continue to develop capacity to improve traditional projects with green solutions, create innovative funding mechanisms to fund stand-alone green projects, and provide support to municipalities that are hard pressed to repay loans.

Through administration of the SRF and other sources, PENNVEST makes available the largest amount of money for water infrastructure in Pennsylvania.

### *State Revolving Fund—Background*

The Clean Water State Revolving Fund was created in 1987 to replace the grant program that was responsible for the construction of wastewater treatment plants around the country.<sup>47</sup> The Clean Water SRF was complemented by a Drinking Water State Revolving Fund in 1996.<sup>48</sup> SRF funds allocated to each state are distributed as subsidized loans at very low interest rates. As loans are repaid, the revenue is returned to the state to restore the available SRF funds available for new loans, thus creating a revolving pool of funding for clean and safe water.<sup>49</sup>

States provide a 20% match to federal spending on capitalization programs. States have the flexibility to offer flexible loan financing including long terms for

repayment, zero interest rates, bond issuance, and a variety of attractive options that effectively leverage additional funding potential and provide infrastructure solutions to additional communities.<sup>50</sup> While neither SRF is targeted at funding polluted stormwater runoff, Clean Water SRF funds can be used to reduce polluted stormwater runoff within areas covered by a stormwater permit or managed by an estuary plan.<sup>51</sup>

Since 1988, the SRF has been administered by PENNVEST, an independent agency governed by a 13-member Board of Directors that meets quarterly to approve decision-making processes and project awards.<sup>52</sup> Projects are awarded utilizing SRF and other sources of money, although the Drinking Water and Clean Water SRFs represent more than 40% of the available funds for Pennsylvania's investment in water infrastructure administered by PENNVEST.<sup>53</sup> Other sources of money for PENNVEST include various state referendum sources, revenue bonds, general funds, and a portion of the Environmental Stewardship Fund, known as Growing Greener, as well as investment earnings. Applicants for SRF funds may be public or private entities for projects associated with wastewater treatment or drinking water delivery, but must be public for stormwater management. PENNVEST will fund all aspects of a project: project design, construction, and rehabilitation.<sup>54</sup>

### ***PENNVEST Administration***

PENNVEST administers the application process, beginning with applicant consultations. Applicants have to demonstrate to PENNVEST an ability to repay any low-interest loan awarded and compliance with state and federal fair business practice regulations. Prior to Board review and approval, applications undergo three reviews: 1) DEP prioritizes applications based on their ability to meet water quality objectives; 2) DCED assesses the economic benefits of projects; and 3) PENNVEST determines an applicant's eligibility and proposed matching contribution for loan size and rate or, in limited cases, grants awards.<sup>55</sup>

Projects submitted to DEP by PENNVEST for assessment of water quality improvements and prioritization will first be subjected to Uniform Environmental Review guidelines. These guidelines assure compliance with environmental impacts of proposed projects under the National Environmental Policy Act, consistency with state plans such as sewage facility plans (Act 537), and proper public participation.<sup>56</sup>

Next, DEP ranks projects based on a Project Priority Rating System Manual (Rating System) that assigns up to 108 points in the categories of public health, aquatic health, infrastructure health, community health, and compliance.<sup>57</sup> Point awards vary depending upon a project's capacity to: eliminate public health hazards caused by untreated sewage discharges; enhance aquatic environments; improve the efficiency and sustainability of treatment systems including structural and managerial; upgrade compliance with federal and state regulations and standards; and encourage regionalization or consolidation of facilities to benefit communities. Additional points are then awarded by DCED and PENNVEST based on job creation, investment protection, and service to communities identified as distressed or priority. Points also are awarded to projects supported by a municipal comprehensive plan or serving sites defined as brownfields or infill development.

Although stormwater management projects are eligible for PENNVEST funding, the Rating System does not value the water quality contributions of stormwater reduction or treatment, placing these projects at a disadvantage from the outset. Further, stormwater projects are only accepted from municipalities covered by a county stormwater management plan, required under Act 167, but not all counties have adopted plans.<sup>58</sup> While a county's Act 167 plan may provide objectives appropriate for rating a project, this requirement excludes many communities from accessing PENNVEST funding. If a municipality is able to submit a stormwater project for funding, review of that project will be guided by Pennsylvania Code that defines the following criteria<sup>59</sup>:

- Public health and safety including the elimination of critical, chronic, or potential safety or health hazards, notably those associated with flooding;
- Environmental impact where an environmental problem affecting a natural resource can be prevented or improved, especially in areas defined by karst topography;
- Economic development including project benefits for distressed communities, opportunities to capitalize on other state development programs, and job creation or retention;
- Compliance or improvement toward achieving compliance with rules and regulations; and
- Adequacy and efficiency where a project serves a single municipality of less than 12,000 people, involves multiple municipalities, or maximizes facility efficiency with regionalization or consolidation of part or all of the facility's function, operation, or maintenance.

Unfortunately, these criteria are not matched with a ranking process comparable to the Rating System for wastewater and drinking water projects, making it more difficult for a stormwater project to compete with a traditionally funded type of project. And, neither the Rating System nor Pennsylvania's code defining criteria for stormwater projects explicitly rates or encourages green infrastructure or water efficiency despite their ability to contribute cost-effective and efficient solutions to water management problems. In summary, there are a number of administrative hurdles that contribute to the limited number of stormwater applications for funding that should be improved.

Nonetheless, PENNVEST does use a very small portion of their funding for stormwater. By example, a stormwater project awarded to Lewisburg, Pennsylvania was a multi-generational fitness park incorporating stormwater solutions on a site that was previously un-

As a result of American Rivers' efforts, the State Revolving Fund appropriations included a 20% set aside for Green Reserve Project investments in green infrastructure, water efficiency, innovative management, and energy efficiency.

usable because of flooding.<sup>60</sup> This investment provided an innovative opportunity to manage stormwater runoff from residential neighborhoods, reduce the effects of flooding downstream, and create a community amenity. Although this project is commendable, the minimal number of stormwater projects funded by PENNVEST is not. Further, the Lewisburg project highlights the need for PENNVEST, with the technical expertise at DEP, to increase their outreach to communities and promote green infrastructure solutions. Additional benefits from the project could have been achieved by a more comprehensive approach that included features such as porous pavement for the playground and parking areas.

#### ***New Directions—PENNVEST***

2009 has been the "year of change" for PENNVEST. Influenced by a failing national economy, new leadership in Washington, DC, the Governor's drive to support infrastructure, and specific advocacy by American Rivers, for the first time PENNVEST awarded funds to projects on their green merits. To stimulate the nation's failing economy, the new ad-

ministration passed ARRA, which included appropriations to the SRF. As a result of American Rivers' efforts, the SRF appropriations included a 20% set aside for Green Reserve Project investments in green infrastructure, water efficiency, innovative management, and energy efficiency. ARRA also required 50% of the distributions to be administered as grants,<sup>61</sup> which served to maximize the green infrastructure component and encourage green stormwater management solutions.

This critical funding opportunity has been a challenge for some states to administer due to the tight timelines for everything from grant application to construction and the fact that green approaches are new to some states. Thus Pennsylvania, as most states, defined fundable projects with the infusion of stimulus dollars as those "ready to go," meaning permits in hand, designs developed, and ready to bid. Although the awarded projects were not always the best or even the greenest, they were a clear step toward achieving water quality improvements through green infrastructure.

In February 2009, PENNVEST awarded the City of Philadelphia a \$30 million low-interest loan for green projects throughout the city. This was the first set of projects reviewed as green and included practices such as permeable pavement and street tree plantings. The loan was awarded without the constraints of the stimulus timeline to permit Philadelphia adequate project administration and cost recovery time, and so the entire \$44.6 million, for Pennsylvania's share of the Green Reserve, was distributed along with SRF awards to 38 projects across the state in July 2009.<sup>62</sup>

A sample of green projects awarded include:

- \$185,000 to Luzerne Conservation District to eliminate stormwater runoff from its site by constructing a rain harvest system, an infiltration trench, and 8,200 square feet of porous pavement;

- \$85,600 to Factoryville Borough to install a green parking lot and reduce potential contamination to an Exceptional Value stream; and
- \$1.8 million to Chester County Conservation District to reduce stormwater contamination of local streams with 34 separate activities including riparian buffers, rain gardens, and stormwater basins.

Some awards demonstrate that **good** projects may have been funded in some cases when the **best** projects couldn't meet the fast tracked needs of the stimulus program:

- \$5,945 to reduce stormwater by planting 20 trees along two streets in Susquehanna County; and
- \$51,075 for West Rockhill Township to replace culverts, stabilize roadside swales, and haul away sediment prone to contaminate a stream during wet weather events.

Other projects may not be appropriate uses of the Green Project Reserve and SRF dollars, as described by EPA, despite their water quality benefits:

- \$131,044 to grade and resurface roads in Lake Township to reduce sediment runoff; and
- \$870,642 to similarly refurbish roads subject to runoff during heavy rains in Sullivan County.

Although the application of Green Reserve funds has not been an easy process nor perfectly applied, it has encouraged PENNVEST to broaden their outreach, solicit green projects, and adapt the application and administration process for funding to accommodate smaller and greener projects. PENNVEST will complete their assessment in spring 2010<sup>63</sup> after the ARRA dollars have been allocated and projects will be near completion.

### **Recommendations**

There are several potential areas where change may benefit infrastructure management by facilitating greener approaches and more funding for stormwater.

First, although the amount of funds for water management as a whole is insufficient to meet all needs, many can be met more efficiently by funding stand-alone green projects, comprehensive municipality or watershed-wide green plans, and prioritizing applications for traditional hard infrastructure projects to include complementary green practices. Immediate focus on greening the gray projects will avoid many administrative hurdles.

Second, the administrative hurdles must be cleared to encourage non-traditional applicants, allow new types of projects, and broaden funding strategies. Working closely with DEP, PENNVEST should develop ranking criteria that acknowledges the value of stormwater management and green infrastructure toward meeting water quality goals. DEP should be available to advise PENNVEST applicants and potential applicants about technological advances to achieve more sustainable infrastructure, and more importantly, more sustainable water resources for Pennsylvania's communities. And, PENNVEST must explore a variety of funding mechanisms that will maximize the awards to municipalities that cannot manage the standard loan structure without excessive financial or administrative burden.

Although the requirement for applicants of stormwater projects to demonstrate adherence to a county's Act 167 plan is a laudable attempt to support sound stormwater management, the requirement is an administrative hurdle. Some leniency should be accepted for projects developed in counties where planning is at least underway. Until funding for the Act 167 stormwater program is restored, and technical support from DEP is available, leniency is especially important.

Finally, PENNVEST must closely examine the Green Project Reserve awards granted in July 2009 and determine how best to solicit and award grants to more

of the best examples and eliminate spending precious funds on projects that do not clearly meet the intent of the SRF or achieve notable water quality improvements as dictated by PENNVEST objectives.

PENNVEST has demonstrated in the past a great capacity to be receptive to positive changes, including the agency's rapid response to the funding opportunity afforded by the economic stimulus. Change in each of the areas mentioned above will result in a greening of gray projects, more applicants for stand-alone green projects, and greener planning across municipalities or watersheds that will have a broad and lasting impact on the health of Pennsylvania's waterways.

### **Department of Environmental Protection: Coastal Zone Management**

In addition to providing technical review of PENNVEST applications, Pennsylvania's DEP directly administers three notable programs that fund stormwater management and green infrastructure practices. These include the federal Coastal Zone Management (CZM) Program of the National Oceanic and Atmospheric Administration (NOAA) and two small programs that support planning (see DEP: Planning Grants Program, page 18). The CZM is an effective program that embraces green infrastructure solutions and understands the importance of stormwater management. Yet, it is hampered by a slow federal award process, a 50% match requirement and a very narrow geographic scope.

The Coastal Zone Management Act authorized NOAA to distribute funds to states through a state-appointed management agency. States have primacy to develop comprehensive plans to manage and balance competing uses for coastal resources. NOAA provides oversight and coordination with other federal agencies.<sup>64</sup> In Pennsylvania, the CZM program is administered by the DEP Water Planning Office for the Delaware River Estuary and Lake Erie. The program has provided more than \$50 million to coastal resource management projects in Pennsylvania since the plan's approval in September 1980.<sup>65</sup>

Its priorities follow:

- Integrate coastal issues into a comprehensive agenda for watershed management and ecosystem protection;
- Expand the use of planning tools such as Geographic Information Systems (GIS);
- Catalogue wetlands and monitor degradations; and
- Emphasize stormwater management in the Delaware River estuary coastal zone.<sup>66</sup>

CZM has funded innovative projects utilizing green infrastructure for stormwater management despite its limited geographic scope. The program awards matched grants up to \$50,000 to municipalities, authorities, state or local agencies, and non-profit groups to cover activities from planning and design to land acquisition and construction. In Pennsylvania, annual awards range from \$1 million to \$1.5 million.<sup>67</sup> The emphasis is on restoration within the coastal interface, although the contribution of land activities to coastal zone management is recognized. Stormwater projects in the Delaware River zone funded by NOAA through DEP include:

- Stormwater Inventory and Prioritization: \$40,000 in 2004 for Pennridge area;
- Stormwater Wetlands Monitoring: \$50,000 to Villanova University to produce field studies that measure metal removal efficiency at the university's stormwater wetland;
- Stormwater Retrofit Technical Assistance: \$48,300 in 2004 to the Pennsylvania Environmental Coalition and partners to educate and assist municipal officials, and create ten retrofits to traditional stormwater retention basins and six parking lots in the Neshaminy watershed; and

- Springfield Township Stormwater Management BMP Park: \$42,100 applied to the design and bidding of BMP stormwater solutions at a 13-acre municipal site.<sup>68</sup>

Eligibility language for the CZM grants issued through DEP does not encourage or specify that stormwater management projects be non-structural, but the language freely allows submission of such projects because emphasis is placed on low-cost solutions, explicitly stating that “construction must provide the requisite connection to the land/water interface.”<sup>69</sup>

The narrow geographic application of this funding program remains its most notable drawback as a tool to improve the application of funds to green infrastructure solutions for stormwater management. The program is one of the few funding options in Pennsylvania through which innovative stormwater management is categorically accepted and does receive funds. The geographic scope is particularly troublesome since the awards made annually by DEP and NOAA prioritize projects that directly serve the coast, despite eligibility criteria that define the priority zone to include tributaries within the coastal zone.

#### ***New Direction: DEP CZM Program***

State and federal budgets and guidance and regulation are the external factors currently influencing the capacity of these fund sources to support non-structural stormwater practices.

There is no indication that CZM funds from NOAA will be eliminated or reduced, but announcement regarding awards from the 2009-10 CZM application are now months overdue. Recent, although again later than normal, solicitation by DEP applications to the 2010-11 CZM program indicates continuity of the program. The program again includes opportunities to fund stormwater management and best management practices.

The new eligibility criteria also include prioritization of required plans and the development of planning:

“Support development, implementation, or enforcement of Act 167 stormwater management plans, implement water quality improvement/enhancement projects recommended in the Act 167 plan, or implement innovative structural or non-structural BMP demonstration projects.”<sup>70</sup>

CZM funds could significantly enhance planning grants offered through DEP to Pennsylvania’s few counties within the coastal zone.

### **Recommendations**

It may be unlikely and unreasonable to suggest that the CZM program issue awards more expeditiously or with a lesser match requirement. But, a quicker applicant review and award process, and a more affordable match would be beneficial to applicant planning. Similarly, the geographic boundaries of the program are unlikely to be altered. Yet, the geographic influence of the program can be strengthened. To maximize the program’s capacity to fund green practices, DEP and NOAA must apply rankings equally for land-based projects interfacing significant tributaries within the coastal zone as well as those interfacing the actual coastline.

### **Department of Environmental Protection: Planning Program Grants**

These two small grant programs support the planning efforts of counties and municipalities complying with state stormwater management programs. Each is a promising resource that could be better utilized by localities if the state’s stormwater management program were more fully integrated, promoted, and enforced.

Through this program, the Bureau of Watershed Management at DEP provides grants, technical assistance, and reimbursements to municipalities and counties for stormwater planning activities. Pennsylvania’s Stormwater Management Act was amended in 1985 to provide for the award of grants up to 75% of allowable costs in two programs:<sup>71</sup>

Stormwater Management Planning and Implementation. Awards are reimbursements to counties for preparing or revising stormwater plans required under Act 167. The average award is \$200,000.

Enactment and Implementation of Stormwater Ordinances. Municipalities are reimbursed for costs incurred to prepare, administer, enforce, implement, and revise ordinances required by county stormwater management plans. On average, these grants distribute \$1,400 to each municipal applicant.

The programs allow for reimbursement of most costs directly related to stormwater management planning including: consulting fees, inspections and monitoring, technical and legal services, and administrative costs associated with public meetings and mileage. Municipalities may only request reimbursement of ordinance development after a county plan has been approved. Furthermore, municipalities may not request reimbursement for costs offset by income from any permit or review fees imposed by the municipality.<sup>72</sup>

Through the first 15 years of the program, counties received nearly \$7 million in reimbursements for planning, and municipalities were reimbursed just over a quarter of a million dollars.<sup>73</sup> The program serves a valuable role. Helping communities prepare stormwater plans and regulation opens funding doors for localities. For instance, counties with completed Act 167 plans were eligible for the unprecedented water resource management funds available in 2009 through ARRA. Some project applicants never applied for stimulus dollars because their county lacked approved stormwater planning.

Today, the program remains underutilized, consistent with slow compliance by localities to adopt stormwater management planning. Even with this funding option, compliance has been hard to influence because the state’s corresponding program guidance is poorly promoted and enforced by DEP.

### ***New Directions: DEP Planning Grants***

The underlying state guidance tied to the use of these funding programs are the Pennsylvania Stormwater BMP Manual and the Pennsylvania Model Stormwater Management Ordinance. This is problematic as the 2006 BMP Manual is currently being updated and the Model Ordinance has never been officially released as final. Both are expected to be complete and referenced in Pennsylvania's 2010 revised urban stormwater permit. However, the draft permit is not strongly tied to the BMP Manual, and creates a disincentive for communities to adopt strong ordinances as a more complex permit application is required for any locality that develops an ordinance different from the state's unofficial model. Until state guidance and regulation are reconciled, finalized, and promoted, full use of the planning grants will not occur.

These funding sources could help promote green infrastructure practices by relying on the guidance documents that include an array of non-structural solutions to complement structural approaches.

Changes to regulation and guidance proposed for completion in 2010 provide the best opportunity for these funding programs to increase the use of green infrastructure solutions within local planning. Change will be most relevant to more than 900 small urban municipalities because planning supported by these funds is required under the urban stormwater permits and the revised permit is expected to institutionalize green infrastructure practices to some degree. Unfortunately permit updates will be two years overdue, delaying these positive changes.

Regrettably, the grant program received no funding from the state budget passed in October 2009.<sup>74</sup> Although it has been difficult to envision how these funding programs for planning could succeed at supporting sustainable stormwater approaches under a seemingly broken management program, it is more difficult to see the management program improving without resources to support local compliance to planning requirements.

### ***Recommendations***

These recommendations are made assuming the program will be restored in the state budget in the 2010-11 fiscal year.

It is critical that DEP improve, complete, and promote all aspects of its stormwater program. Regardless of lagging regulatory efforts, DEP can still strengthen the applicability of these funding programs. As demonstrated by the new language in the eligibility criteria for the CZM program, DEP is actively promoting Act 167 planning. The agency must similarly promote the funding program to assist localities with planning. Further, the agency should systematically support these efforts with training and technical resources. Training and resources should include green infrastructure practices. Because these practices are cost effective, promoting them through the funding program will in turn add fiscal efficiency to local planning efforts. As a move to capitalize on the grant program, DEP should prioritize applications from localities wanting to upgrade plans to incorporate new and sustainable BMPs.

### **Department of Community and Economic Development (DCED)**

DCED is responsible for a host of grant and loan programs to serve communities in Pennsylvania. None of these programs is explicitly designed to fund stormwater management, but several support water infrastructure and indirectly fund stormwater. Today these programs play an important role in helping sustain water resources for Pennsylvania's communities. Because the 2009 state budget severely cut environmental programs, agencies such as DCED must find ways to make up the difference by strengthening funding programs that provide cost effective water infrastructure that employ green practices.

DCED programs that fund water infrastructure include:<sup>75</sup>

Appalachian Regional Commission Grant Program. Supplemental grants to municipalities, authorities, and public or private organizations for construction

of water or sewer systems including treatment plants. These funds have supported separation of stormwater from sewer within built systems.

Community Development Block Grants and Small Municipality Entitlement and Competitive Grant Program While only a small percentage of the program goes toward water management, the total investment is significant and can result in \$40 million to \$50 million invested annually in drinking and wastewater. Again, stormwater resources have been directed at structural collection systems to separate stormwater from wastewater.

Floodplain Management Program These funds support municipalities with technical and financial assistance to complete requirements associated with the National Flood Insurance Program and Pennsylvania Floodplain Management Act. Funds are directed at planning and mapping activity. Support for stormwater activity is limited to localities developing progressive flood reduction measures.

Infrastructure Development Program These grants or loans must support infrastructure necessary for industrial, agricultural, manufacturing, or research business development that will generate jobs. Projects sponsored by local governments receive up to \$1.25 million. Amongst other activities, these projects may fund drainage systems and water systems.

New Communities—Elm Street and Main Street Programs These provide funding for revitalization of downtowns and major arteries that radiate from downtowns. The Elm Street program is a Rendell Administration initiative that includes a requirement to plan for green improvements in revitalizing neighborhoods. The Community Action Agency of Delaware County developed a revitalization plan for the Delaware County Lansdowne-Yeadon community that prioritized stormwater management as a part of its green objectives.

DCED has a number of programs focused on community revitalization. The capacity of these programs

to serve communities with sustainable infrastructure that delivers clean water would increase if staff were encouraged to promote and fund green infrastructure.

### ***New Directions—DCED***

DCED programs were not exempt from budget cuts. Until Pennsylvania's budget woes improve dramatically, DCED will likely fund less and less stormwater management despite greater need resulting from similar cuts to DEP and DCNR budgets.

While many DCED staff members do not recognize their agency's ability to fund stormwater, they do recognize the role DCED has funding water infrastructure projects for Pennsylvania's communities. The Commonwealth Financing Authority, an independent board housed under DCED, currently administers a priority of Governor Rendell's authorized by the 2008 legislature and known as H2O PA.<sup>76</sup> In 2009, this funding program distributed \$46.6 million in grants to improve high-hazard dams, \$13.6 million to flood control projects, and \$490.8 million for 286 wastewater treatment and drinking water projects.<sup>77</sup> Some of these projects managed stormwater by separating stormwater from wastewater flows but none appeared to incorporate cost effective non-structural solutions. Because projects must be at least \$500,000 to receive grants, it is unlikely that any of the remaining \$249 million will be awarded to stand-alone green projects. With the current eligibility guidelines, the remaining funds will most likely support traditional, gray infrastructure, projects.

### ***Recommendations***

DCED should encourage applications to H2O-PA for gray infrastructure projects to incorporate green solutions, particularly because the eligibility requirements promote integrated approaches to water management and system operation. Specifically, green solutions that support gray projects should be prioritized, promoted, and awarded by any DCED program directed to water infrastructure management.

Additionally, DCED promotes the concept of re-use and rebuilding in its revitalization programs as pre-

scribed by the Keystone Principles.<sup>78</sup> Green infrastructure practices and planning are a natural fit for revitalizing urban areas where maximizing the efficiencies of land use is important. Therefore DCED should be the first agency to employ enhanced Keystone Principles that promote “green first” in addition to “re-use first.”

## Department of Conservation and Natural Resources (DCNR)



DCNR is poised for potential transformation from a purely land resource agency to one touting the state’s most progressive plan to green its funding programs, including green approaches to manage stormwater.

DCNR is the land management agency that distributes funding to communities and awards contracts for work on public lands. Traditionally the land and water interface represented the point at which DCNR stopped support of projects aimed at enhancing ecological functions and transferred resources to support aesthetic or recreational activities such as river access points.

In more recent years, DCNR has professed the goal to “assist communities in building green infrastructure and greenway connections.”<sup>78</sup> Yet, aside from the notable DCNR Tom Ridge Environmental Center at Presque Isle State Park in Erie, which has received Leadership in Energy and Environment Design Green Building Rating System (LEED)<sup>80</sup> certification, DCNR green investments have been primarily in the form of tree plantings and open space preservation.

A sampling of greener projects funded by DCNR includes:<sup>81</sup>

*Brownsburg and Lookout Parks, Bucks County.* A 37.6 acre park on the Delaware River with ball fields and trails that utilize a wetland infiltration basin;

*Open Space Preservation Plan, Cumberland County.* Using Keystone Grant Funding, one of several DCNR programs, the agency awarded \$93,000 to produce the county’s open space and smart growth plan;

*Darby Creek Greenway, Delaware County.* Funding supports the watershed conservation plan to develop an urban “ribbon of green” including riparian buffers, open space, and stream corridor restoration;

*Lawrence County Greenway and Open Space Plan.* Funds preservation and reclamation of natural floodplains; and

*Williamsport City Parks Master Site Plan, Monroe County.* Funding is focused toward reinvestment in urban areas to establish sustainable and attractive communities.

More focused on water resources, DCNR established a River Towns initiative to help communities pursue economic revitalization and new mixed-use development with resources directed at design of greenway enhancement or redevelopment. Unfortunately, the River Towns program lacks dedicated staff resources and thus has been slow to develop and may never fully get off the ground.

### *New Directions—DCNR*

The green programs goals of DCNR will be reflected within the programs DCNR funds. Again, this assumes the agency is able to sustain the state's severe budget cuts. If that hurdle is overcome, DCNR will apply a new strategy to its funding application reviews with the assistance of an Environmental Scorecard for Grant Applicants. The scorecard is the result of a "Greening the Grants" study finalized by DCNR during summer 2009.<sup>82</sup>

The scorecard is a self-evaluation form for applicants intended to help them complete the "green criteria" section of the grant narrative, which is then used during application review. The scorecard includes<sup>83</sup> four sections: 1) connecting people to nature, 2) green design and construction practices, 3) natural landscapes and trees, and 4) water resources. Each section contains a check list of green activities. During self evaluation, applicants can credit projects that propose practices described on the list. For instance, the check list suggests "site design will include features to build awareness and educate site users on various sustainable management practices." A proposed project with outreach activities that teach the benefits of green practices may "take credit" for this item on the scorecard's list. Similarly, the green infrastructure practices within U.S. Green Building Council LEED certification can be applied to new buildings or renovations. And notably, the scorecard encourages rain barrels, rain gardens, and permeable pavement to minimize use of potable water, promote ground water infiltration, and reduce runoff. The scorecard institutes one requirement: principles consistent with stormwater permitting for construction sites and post-construction activity.

This is a laudable effort to green funding activity. If the forthcoming budget cycle allows DCNR the ability to distribute grants, the scorecard will be applied for the first time in 2010, providing the opportunity to evaluate the outcomes. If DCNR is successful in recruiting greener applications and/or applying greener ranking criteria to the eligibility criteria during project review, the resulting projects

will demonstrate green practices over a wide area and in highly visible, public locations.

### *Recommendations*

To ensure success, the "Greening the Grants" strategy must be accompanied by significant outreach and education to potential applicants and contain a strong prioritization and evaluation methodology.

To further increase the likelihood of success, DCNR should employ the self-evaluation scorecard measures as criteria to rank the sustainability quotient of proposed projects. Whether or not DCNR successfully implements the scorecard, the concept should be a model for other state agencies.

### **Rural Utility Services (RUS)—USDA**

Rural Development within the U.S. Department of Agriculture is committed to building strong and vibrant rural communities and therefore supports essential water infrastructure in communities with less than 10,000 people. The capacity to fund green infrastructure practices is unrealized but, if instituted, RUS would be the only program in Pennsylvania focused on greening water infrastructure in rural areas.

In 2003, Rural Development structured its offices to offer local support through Rural Utility Service funding programs including:<sup>84</sup>

- *Water and Environmental Loans* to develop, improve, and repair water, sewer, and storm drain systems;
- *Water and Disposal Grants* to reduce the costs of water and waste disposal; and
- *Solid Waste Management Grants* intended to reduce or eliminate water pollution.

In 2008 Pennsylvania received about \$69 million: \$55 million in low-interest loans, \$13.8 million in water and disposal grants, and \$400,000 for solid waste projects. Despite eligibility language authorizing funding for "Storm drainage—construct or improve storm drains and related facilities," few dollars have been di-

rected at stormwater management.<sup>85</sup> Unfortunately, grant funds for municipal stormwater improvements are becoming proportionately less as the need for water supply and wastewater treatment is considered overwhelming in the rural and small cities served by RUS.

### *New Directions—RUS*

RUS continues to support traditional hard infrastructure solutions, presented by applicants and supported by DEP, rather than progressively transforming towards funding greener, sustainable solutions. While no greener movement is apparent, there is a shift in the balance between loan and grant distributions. Over the last five years, the balance has tipped from nearly 50/50 to almost 80% loan and 20% grant.<sup>86</sup> This shift may adversely affect small communities that already lack the resources for technical expertise.

### *Recommendations*

RUS should evaluate the sustainability of the trend away from grant awards for a program intended to prioritize and serve under-resourced localities. RUS may better benefit Pennsylvania's rural communities and rebalance loan and grant distributions by complementing gray project funding with cost effective small green grants. By prioritizing small grants for green infrastructure practices, dollars distributed by RUS will go a long way toward sustainability of the entire investment and better serve low-income communities.

### **Growing Greener**

The commonwealth's flagship Environmental Stewardship and Protection Act is more commonly known as "Growing Greener." Admired by many states, Growing Greener may soon outgrow its purpose and its budget. If the legislature fails to renew this program significant political ill will from past beneficiaries may result. The programs' many supporters hope that threat will help to spur reauthorization. If Growing Greener is sustained, the program will have an opportunity to improve its processes to fund truly sustainable water management projects.

The program grew from several environmental programs, including Governor Casey's community

recycling initiative designed to limit out-of-state trash in Pennsylvania's landfills and allow the state to capitalize on its own trash. Governor Ridge signed the Act in December 1999 directing the use of tipping fees, a tonnage collection fee from municipal landfills.<sup>87</sup>

For the first five years, the Act provided \$650 million for farmland preservation, open space, park maintenance, watershed restoration, abandoned mine land reclamation, and water and sewer infrastructure upgrades. The funds were distributed by four agencies including DEP, DCNR, PENNVEST, and the Department of Agriculture as grants with a 15% match requirement. Awards were made to municipalities, counties, watershed groups, environmental non-profits, municipal authorities, and county conservation districts to address pollution through watershed-based planning, restoration, or protection.<sup>88</sup>

In June 2002 Governor Mark Schweiker increased Growing Greener appropriations to \$1.2 billion and extended the program to 2012. Revenue shortfalls greatly reduced actual spending which prompted Governor Rendell to propose Growing Greener II. Voters approved \$625 million for a six-year program in May 2005. Tipping fees remain the cornerstone of debt management for the program.<sup>89</sup>

Over time, the application criteria have developed narrower preferences and requirements often be-moaned by Conservation Districts and DEP regional staff as stringent or cumbersome. Criteria also have varied year-by-year resulting in an inconsistent program that seemingly welcomes non-structural stormwater solutions one year and not the next.

Currently the program identifies state and regional "priority watersheds" within which are eligible activities. The current application prioritizes watersheds with pollutant load clean-up plans or those defined by DEP as impaired, in addition to specific watersheds within each of six DEP regions. Statewide project preferences include easements and open space plans to support sustainable buffers, dam removals, water conservation by leak and loss control

or re-use, nutrient reductions through efficient BMPs, and technology to control invasive species.<sup>90</sup>

Each region defines priority activities that often encourage stormwater management and sometimes green infrastructure. For instance, the current northwest guidelines support “innovative or educational stormwater BMPs” while the southwest more specifically prioritizes “implementation projects to retrofit existing stormwater systems with new BMPs or floodplain reconnection.”<sup>91</sup>

The priorities tend to be well reflected by the projects awarded. Growing Greener has funded many demonstration projects for green infrastructure and comprehensive projects on public lands. For instance, in 2003 Growing Greener distributed approximately \$400,000 to projects that included porous pavement parking lots and wetland retention. In 2006, \$1.4 million was directed at design and construction of projects that incorporated green infrastructure components such as rain harvesting for non-potable re-use, rain gardens, green roofs, and porous pavement. Although 2007 priorities and criteria resulted in no awards defined as non-structural stormwater, the current criteria funded a significant number of riparian buffers and instream restoration projects, some BMP structural retrofits including retrofits to commercial and residential stormwater systems. The 2008 awards (announced in February 2009) also included these green infrastructure projects:<sup>92</sup>

- \$36,595 for rain gardens at Allegheny College’s Admission Center;
- \$63,096 for bio-swales to reduce flooding from runoff in Springfield Township;
- \$24,634 for a pervious gravel driveway to reduce erosion at a canoe launch; and
- \$239,179 to comprehensively install stormwater BMPs, water re-use practices, and on-site sewage treatment facilities at Stroud Water Research Center.

### *New Directions — Growing Greener*

The current Growing Greener appropriation is due for reauthorization in 2012 and yet is expected to be ‘spent out’ as early as 2010.<sup>93</sup> Advocates appealed to state leaders to consider bolstering Growing Greener with new revenue from tax severances on the growing oil and gas industry, but the tax severance proposal did not survive the 2009 budget debates.<sup>94</sup>

The 2008 awards (announced in February 2009) also included these green infrastructure projects:<sup>92</sup>

- \$36,595 for rain gardens at Allegheny College’s Admission Center;
- \$63,096 for bio-swales to reduce flooding from runoff in Springfield Township;
- \$24,634 for a pervious gravel driveway to reduce erosion at a canoe launch; and
- \$239,179 to comprehensively install stormwater BMPs, water re-use practices, and on-site sewage treatment facilities at Stroud Water Research Center.

Growing Greener has been a showcase program that Pennsylvania’s leadership is unlikely to willingly abandon, but it is uncertain how it may evolve from the state’s budget crisis or from reauthorization language in the legislature.

### *Recommendations*

The future Growing Greener program needs a sustainable funding source and needs to redistribute its funds to sustainable projects. Sustainability should no longer be measured as “lasting 20 years,” a concept that historically described structural water management projects. Rather, the program must look toward funding management practices capable of water quality improvements that enhance resiliency in natural and built systems, thereby creating sustainable funding mechanisms and fostering long-term resource sustainability.



## CONCLUSION AND RECOMMENDATIONS

Well-integrated policy, planning, regulation, and funding will create an enduring system for stormwater management that institutes efficient, effective, and sustainable practices.

There is no doubt that Pennsylvania has some tough hurdles to overcome to secure sustainable water management. These include an entrenched municipal structure with an enormous number of municipalities; planning, regulatory, and funding programs that have strong traditions of supporting hard infrastructure while often ignoring the value of managing stormwater at its source; and an overwhelming gap between available financial resources and the growing need to address and resolve aging, deteriorating, and over-stressed water infrastructure systems.

Polluted stormwater runoff is a significant contributor to the water management challenges Pennsylvania faces reflected by the prevalence of impaired waterways and increases in frequency and severity of flooding attributable to this source. Meanwhile, a growing body of research and guidance across the nation points to green infrastructure practices as viable tools to manage stormwater runoff and help minimize the overall impact on water infrastructure systems and communities. Pennsylvania has yet to fully institute green practices in stormwater regulation, planning, and guidance. The result is that the Chesapeake Stormwater Network ranks Pennsylvania *last* amongst five Bay states on the 2009 Baywide Stormwater Scorecard. With an overall grade of 'D,' the state receives an 'F' with regard to its ability to provide financing to stormwater management needs.

Indeed, a survey of attendees at Solutions for Municipalities Managing Stormwater, a workshop hosted by American Rivers in January 2009, listed a lack of local funding as the primary reason for failure to comply with stormwater management planning and management requirements. The following recommendations seek to advance the institutionalization of sound stormwater management practices in Pennsylvania.

Well-integrated policy, planning, regulation, and funding will create an enduring system for stormwater management that institutes efficient, effective, and sustainable practices.

**RECOMMENDATION 1: Foster a collaborative relationship and consistent approach amongst stormwater management planning, regulation, and funding institutions to promote and advance the adoption and implementation of green practices.**

- Improve Pennsylvania’s stormwater management program and corresponding grade:
  - Integrate green infrastructure solutions strongly and consistently within the BMP Manual, Model Ordinance, and MS4 permit<sup>95</sup>.
  - Provide intensive technical support through outreach for water infrastructure funding applicants to improve the quality of funding proposals and projects.
- Through an ongoing stakeholder process, further develop state policy initiatives such as the State Water Plan and the Sustainable Water Infrastructure Task Force report that promote green practices in water management and imbed these practices in regulation and funding practice.

**RECOMMENDATION 2: Establish principles for investment in green solutions for stormwater management for all funding sources that will guide funders and applicants toward natural infrastructure alternatives.**

- The DCNR Environmental Scorecard has elements that offer a means to enhance and transform or complement the Keystone Principles’ “re-use first” with “green first.” These green principles must be imbedded in each agency’s funding application process. The PENNVEST ranking system would benefit from this model to facilitate consistency in the Ranking System to advance sound stormwater management.

- Integrate these principles in planning and funding and incorporate consistent and well-defined accountability measures across agencies.

**RECOMMENDATION 3: Diversify funding sources for Pennsylvania’s water infrastructure needs to maximize the benefits of green practices instead of, or in conjunction with, traditional hard infrastructure.**

- Follow Sustainable Water Infrastructure Task Force discovery:<sup>96</sup>
  - Assess needs and resources fully, include stormwater management at pipe and sources.
  - Seek funding from an array of sources— federal, state, and local; incentives, fees, and taxes.
  - Permit right-sizing of operations and management for multi-municipality functioning for stormwater management.
- Weigh the multiple benefits of green infrastructure before investing in hard structural practices.
- First fund water management planning that embodies a “green first” approach.
  - Prioritize distribution of DEP grants to localities newly planning or updating plans to incorporate green infrastructure.
  - Support municipal or watershed-wide planning that includes comprehensive green practices such as the Philadelphia model, with long-term investment.

**RECOMMENDATION 4: Improve outreach so that those responsible for local implementation of stormwater management practices know where to find technical and financial resources that support sustainable green practices.**

Outreach recommendations are imbedded in the actions of the prior three recommendations but deserve emphasis. To successfully make the pivotal change to sustainability, Pennsylvania’s water management programs and investment principles and practices must be fully accessible and usable by all local water resource managers.

Together, the four recommendations represent progressive institutional changes that will help remedy Pennsylvania’s current unsustainable water infrastructure funding system by intensifying policymaker, agency, and public attention and focus on stormwater management that embraces green infrastructure. More important, adoption of these recommendations for funding and institutionalization of green infrastructure will help to ensure Pennsylvania’s future as a vibrant economic engine and as a state where people want to live.

While there is no doubt that Pennsylvania has difficult obstacles to surmount in greening both its funding and its water infrastructure, there is also no doubt that clean water is among the Commonwealth’s most precious resources. The health of its economy and communities depend on the abundant supply of clean, fresh water. Yet, Pennsylvania’s—and the nation’s water infrastructure—is seriously outdated, posing imminent threats to both water quality and supply. Like other cities across America, Pennsylvania’s drinking water, wastewater, and stormwater systems are aging, deteriorating, and under increasing pressure from growing consumer demands and from more frequent and more intense flooding and drought.

The approaches employed for centuries in the United States will not solve the magnitude of today’s water challenges. The Keystone State is at a turning point and the choices its citizens and leaders make in the coming months and years have the power to fundamentally transform the way Pennsylvania manages its water.

A 21st century approach would recognize “green infrastructure” as an integral component of water management design. In fact, green infrastructure, replicating nature’s treatment of water, is the best, most cost-effective, and most flexible way for communities to address the water resource challenges they face. American Rivers encourages Pennsylvania to accept the challenge before it, to assert its leadership role, and to help establish models for green infrastructure and funding that will benefit Pennsylvania for decades to come and that will advance standards for sustainability for other states nationwide.



## APPENDIX: RESOURCES FOR INNOVATIVE STORMWATER MANAGERS

### Funding sources:

PENNVEST—The Pennsylvania Infrastructure Investment Authority finances local clean water infrastructure by administering state and federal resources.

<http://www.portal.state.pa.us/portal/server.pt/community/pennvest/9242>

DEP, Coastal Zone Management—Pennsylvania’s Department of Environmental Protection administers the National Oceanic and Atmospheric Agency’s funding program to protect and improve the state’s Delaware River estuary and Lake Erie coast.

<http://www.dep.state.pa.us/river/czmp.htm>

DEP, Planning Grants—One program reimburses counties developing required stormwater plans and another reimburses municipalities developing ordinances to enact stormwater management practices.

<http://www.dep.state.pa.us/grantscenter/ProgramSummary.asp?ID=7>

<http://www.dep.state.pa.us/grantscenter/ProgramSummary.asp?ID=6>

DCED—The Department of Community and Economic Development administers an entire suite of programs to support the economic vitality and thus includes water infrastructure highly valued by communities.

<http://www.newpa.com/index.aspx>

DCNR—Funding projects that occur on state-owned lands or promote natural resources within communities, the Department of Conservation and Natural Resources uses several funding programs. Check out the new Environmental Scorecard for Grant Applicants.

<http://www.dcnr.state.pa.us/brc/grants/indexgreen.aspx>

Rural Utility Service (RUS)-USDA—The Rural Service Utility program distributes funds for essential water infrastructure projects to support rural localities and cities with a population of less than 10,000.

<http://www.rurdev.usda.gov/pa/>

Growing Greener—Pennsylvania’s Environmental Stewardship and Protection Act now funds many environmental needs including water and sewer infrastructure upgrades.

<http://www.depweb.state.pa.us/growinggreener/site/default.asp>

### More on Stormwater and Green Infrastructure:

#### EPA

The Environmental Protection Agency is the federal agency guiding stormwater management programs and applying green infrastructure practices:

<http://cfpub.epa.gov/npdes/stormwater/swbasicinfo.cfm>

[http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298)

#### DEP

The Department of Environmental Protection provides oversight to Pennsylvania’s stormwater management programs.

<http://www.depweb.state.pa.us/watershedmgmt/cwp/view.asp?a=1437&q=518682>

**LID Center**

The Low Impact Development Center promotes technologies to protect pre-development hydrology of landscapes.  
<http://lowimpactdevelopment.org/>

**VUSP**

The Villanova Stormwater Partnership researches and demonstrates innovative BMPs.  
<http://www3.villanova.edu/vusp/>

**CWP**

The Center for Watershed Protection helps municipalities translate stormwater management goals from concept to design and production.  
<http://www.cwp.org>

**CSN**

The Chesapeake Stormwater Network promotes more sustainable stormwater management in the Chesapeake Bay.  
<http://chesapeakestormwater.net/>

**PA Stormwater**

This internet forum is for Pennsylvania-specific stormwater management topics.  
<http://www.StormwaterPA.org>

**American Rivers**

American Rivers promotes green solutions to water management practices so clean water is assured for thriving communities.  
<http://www.americanrivers.org/our-work/clean-water/>

***Learn More:***

- Green infrastructure creates a stronger job market.  
[http://www.americanrivers.org/assets/pdfs/green-infrastructure-docs/green\\_infrastructure\\_stimulus\\_white\\_paper\\_final.pdf](http://www.americanrivers.org/assets/pdfs/green-infrastructure-docs/green_infrastructure_stimulus_white_paper_final.pdf)
- Green infrastructure solutions for Pennsylvania municipalities.  
<http://www.americanrivers.org/our-work/clean-water/sewage-and-stormwater/developing-green.html>
- Influencing local policy making.  
<http://www.americanrivers.org/library/reports-publications/local-water-policy-innovation.html>
- Assessing the State Revolving Fund.  
<http://www.americanrivers.org/library/reports-publications/follow-the-money-an-agenda.html>



## ENDNOTES

- <sup>1</sup> Schueler, Tom. 2009. First Annual Bay-wide Stormwater Performance Scorecard. Chesapeake Stormwater Network: Baltimore, MD.
- <sup>2</sup> Pennsylvania Infrastructure Investment Authority. 2009. Projects approved at the July 21 2009 Board meeting. [http://www.pportal.state.pa.us/portal/server.pt/community/programs/9322/hide\\_loans\\_and\\_grants\\_approved](http://www.pportal.state.pa.us/portal/server.pt/community/programs/9322/hide_loans_and_grants_approved) (last accessed October 2009).
- <sup>3</sup> U.S. Environmental Protection Agency, 2003. Protecting Water Quality from Urban Runoff. EPA 841-F-03-003.
- <sup>4</sup> Estornell, Paula, American Rivers Stormwater Workshop, Reaching Water Quality Goals. Presented at *Solutions for Municipalities Managing Stormwater*. (2009)
- <sup>5</sup> Campbell, Harry, Roof Tops to Rivers: The Improving Act 167 Plans. Presented at *Solutions for Municipalities Managing Stormwater*. (2009)
- <sup>6</sup> Newman, Barry, Department of Environmental Protection: Planning to Protect Water Resources—Managing Stormwater Locally. Presented at *Solutions for Municipalities Managing Stormwater*. (2009)
- <sup>7</sup> Campbell, Harry, Roof Tops to Rivers: The Improving Act 167 Plans. Presented at *Solutions for Municipalities Managing Stormwater*. (2009)
- <sup>8</sup> Ibid.
- <sup>9</sup> Belan, Gary and Baer, Katherine, Green Communities for Clean Water, River Network, River Voices 18:1 (2008)
- <sup>10</sup> Molloy, J. and R. Albert, Managing Wet Weather with Green Infrastructure. Presented at *Greening Rooftops for Sustainable Communities*. (2008)
- <sup>11</sup> American Rivers, 2008. Creating Jobs and Stimulating the Economy through Investment in Green Water Infrastructure.
- <sup>12</sup> Stratus Consulting, 2009. A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds. Prepared for Howard M. Neukrug, Director, Office of Watersheds, City of Philadelphia. P. S-3.
- <sup>13</sup> See generally, American Rivers, *Natural Security* (2009) and NRDC, *From Rooftops to Rivers: Green Strategies for Controlling Stormwater and Sewer Overflows* (2006)
- <sup>14</sup> U.S. EPA. Integrating Green Infrastructure into Regulatory Programs. <http://cfpub.epa.gov/npdes/greeninfrastructure/regulators.cfm> (last accessed October 2009)
- <sup>15</sup> The City of Philadelphia Mayor's Office of Sustainability, *Greenworks Philadelphia*, p.36. <http://www.phila.gov/green/greenworks/index.html> (last accessed May 2009)
- <sup>16</sup> The City of Philadelphia, Office of Watersheds, 2009. *Green City, Clean Waters—The City of Philadelphia's Program for Combined Sewer Overflow Control: A Long Term Control Plan Update (LTCPU)*. [www.phillywatersheds.org/ltcpul](http://www.phillywatersheds.org/ltcpul) (last accessed October 2009)
- <sup>17</sup> Cahill, T. and N. Wildfire (2008). The Greening of Pittsburgh: Solving the CSO Problem with Green Infrastructure. Presented at 3 Rivers Wet Weather Sewer Conference.
- <sup>18</sup> Gavin, Andy, e-mail correspondence, Average Efficiencies spreadsheet. (2009)
- <sup>19</sup> Bioretention research at the University of Maryland, <http://www.ence.umd.edu/~apdavis/Bioongoing.htm> (last accessed July 2009)
- <sup>20</sup> U.S. EPA, (2009) Managing Wet Weather with Green Infrastructure. [http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298) (last accessed October 2009)
- <sup>21</sup> U.S. EPA, *Use of Green Infrastructure in NPDES Permits and Enforcement*, EPA Memo to Regional Water Division Directors State NPDES Coordinators, Aug. 2007.
- <sup>22</sup> U.S. EPA. 2008. Incorporating Environmentally Sensitive Development into Municipal Stormwater Programs. EPA 883-F-07-011.
- <sup>23</sup> 33 U.S.C. Section 101
- <sup>24</sup> U.S. EPA. Stormwater Discharges from Municipal Separate Storm Water Systems (MS4s). <http://cfpub.epa.gov/npdes/stormwater/munic.cfm>
- <sup>25</sup> The Clean Streams Law. P.L. 1987, Act 394 of 1937, as amended (35 P.S. 691.1)
- <sup>26</sup> Pennsylvania Department of Environmental Protection. 2007. Pennsylvania's Storm Water Management Act (Act 167). A PA-DEP Fact Sheet.
- <sup>27</sup> Executive Summary, Comprehensive Stormwater Management Policy, Document Number: 392-0300-002, September 2002
- <sup>28</sup> Pennsylvania Department of Environmental Protection. 2006. Pennsylvania Stormwater Best Management Practices (BMP) Manual, 363-0300-002. <http://www.depweb.state.pa.us/watershedmanagement/cwpl/>
- <sup>29</sup> Public comment submitted by Liz Garland, American Rivers to Barry Newman, DEP, July 6, 2009.
- <sup>30</sup> Land Use Planning, Executive Order No. 1999-1. 4 PA. Code Ch.7, 29 Pa. B. 806.
- <sup>31</sup> Pennsylvania Model Stormwater Management Ordinance. March 2008 draft last accessed April 2009. October 2009: publically unavailable, under revision.
- <sup>32</sup> Pennsylvania Economic Development Cabinet. 2005. Commonwealth of Pennsylvania Keystone Principles for Growth, Investment and Resource Conservation. <http://www.newpa.com/find-and-apply-for-funding/keystone-principles/index.aspx>
- <sup>33</sup> Taxpayers for Common Sense, Banking on the Future: Investing in smart Water Strategies for Pennsylvania and the Nation, July 2005, p. 35.
- <sup>34</sup> Creating a Sustainable Solution for Pennsylvania: Governor's Sustainable Water Infrastructure Task Force Report, November 2008, p. 16.
- <sup>35</sup> American Society of Civil Engineers. (2009) Report Card for America's Infrastructure. <http://www.asce.org/reportcard/2009/grades.cfm> (last accessed November 2009)
- <sup>36</sup> The Aspen Institute. (2009) Sustainable Water Systems: Step One—Redefining the Nation's Infrastructure Challenge, Pub. No. 09-011. <http://www.aspeninstitute.org> (last accessed November 2009)
- <sup>37</sup> Building America's Future. (2008) Policy statement. [www.bafuture.org/about](http://www.bafuture.org/about) (last accessed August 2009)
- <sup>38</sup> Governor Edward G. Rendell (2008). "Much of state's infrastructure crisis is hidden" The Patriot News, Opinion, Feb. 5, 2008
- <sup>39</sup> H2O PA Water Supply, Sanitary Sewer and Stormwater Projects, Commonwealth Financing Authority Approved Projects—H2O PA Program. July 2009. [www.newpa.com](http://www.newpa.com) (last accessed August 2009)
- <sup>40</sup> Governor's Sustainable Water Infrastructure Task Force Report. (2008) Creating a Sustainable Solution for Pennsylvania.
- <sup>41</sup> PA DEP. 2008. Pennsylvania Water Planning. [www.pawaterplan.dep.state.pa.us/statewaterplan/docroot/default.aspx](http://www.pawaterplan.dep.state.pa.us/statewaterplan/docroot/default.aspx) (last accessed November 2009)
- <sup>42</sup> U.S. EPA. 2009. Award of Capitalization Grants with Funds Appropriated by P.L. 111-5, the "American Recovery and Reinvestment Act of 2009" Memorandum from James A. Hanlon, Director, Office of Wastewater Management and Cynthia C Dougherty, Director, Office of Ground Water and Drinking Water.
- <sup>43</sup> PENNVEST. 2009. Clean Water SRF and Drinking Water SRF Prioritization, approved by Pennsylvania Infrastructure Investment Authority Board, June 2009. Received July 2009 by e-mail from Brion Johnson, PENNVEST.

- <sup>44</sup> Pennsylvania Infrastructure Investment Authority. PENNVEST 2007/2008 Annual Report. P.9.
- <sup>45</sup> Pennsylvania Infrastructure Investment Authority. PENNVEST 2007/2008 Annual Report. P.7.
- <sup>46</sup> Pennsylvania Infrastructure Investment Authority. 2009. Projects approved at the April 20, 2009 Board meeting. [http://www.pportal.state.pa.us/portal/server.pt/community/programs/9322/hidden\\_loans\\_and\\_grants\\_approved](http://www.pportal.state.pa.us/portal/server.pt/community/programs/9322/hidden_loans_and_grants_approved) (last accessed October 2009).
- <sup>47</sup> Copeland, Claudia. 2000. 96-647: Water Infrastructure Financing: History of EPA Appropriations. <http://www.cnie.org/NLE/crsreports/water/h2o-35.cfm> (last accessed September 2009)
- <sup>48</sup> Otto, B. and G. Belan. 2004. Follow the Money: An Action Agenda for Making Smarter Clean Water State Revolving Fund Investments in the Great Lakes Region. <http://www.americanrivers.org/library/reports-publications/follow-the-money-an-agenda.html> (last accessed November 2009)
- <sup>49</sup> Taxpayers for Common Sense. 2005. Banking on the Future: Investing in Smart Water Strategies for Pennsylvania and the Nation. p.41.
- <sup>50</sup> Ibid.
- <sup>51</sup> U.S. EPA. 2003. Cleaning Up Polluted Runoff with the Clean Water State Revolving Fund. Fact Sheet 832-F-03-004.
- <sup>52</sup> Pennsylvania Infrastructure Investment Authority Act, Act of 1988, P.L. 82, No. 16, updated 10/23/02. Section 4.(a).
- <sup>53</sup> Pennsylvania Infrastructure Investment Authority. PENNVEST 2007/2008 Annual Report. P.9.
- <sup>54</sup> PENNVEST. Financing Clean Water for Pennsylvania. Fact sheet, p.2.
- <sup>55</sup> Ibid.
- <sup>56</sup> PA-DEP. 2003. Guidelines for the Uniform Environmental Review Process in Pennsylvania. 381-5511-111.
- <sup>57</sup> PENNVEST and DEP, Project Priority Rating System Guidance Manual, April 2008.
- <sup>58</sup> Pennsylvania Infrastructure Investment Authority Act, Act of 1988, P.L. 82, No. 16, updated 10/23/02. Section 10 (b)(2).
- <sup>59</sup> 25 Pa. Code 963.9a. Stormwater project evaluation criteria.
- <sup>60</sup> Henning, D. 2006. Multi-Generational Park a Hit in Lewisburg. PENNVEST- Liquid Assets., p.1.
- <sup>61</sup> U.S. EPA. 2009. Award of Capitalization Grants with Funds Appropriated by P.L. 111-5, the "American Recovery and Reinvestment Act of 2009" Memorandum from James A. Hanlon, Director, Office of Wastewater Management and Cynthia C Dougherty, Director, Office of Ground Water and Drinking Water, p.4.
- <sup>62</sup> Pennsylvania Infrastructure Investment Authority. 2009. Projects approved at the July 21 2009 Board meeting.
- <sup>63</sup> Conversation with Brion Johnson, PENNVEST. September 2009.
- <sup>64</sup> Coastal Zone Management Act of 1972 as amended through P.L. 104-150, The Coastal Zone Protection Act of 1996. 16 U.S.C 1452. Section 303.
- <sup>65</sup> Background: Coastal Zone Management Program. [www.dep.state.pa.us/river/about/background.htm](http://www.dep.state.pa.us/river/about/background.htm). (last accessed November 2009)
- <sup>66</sup> PA-DEP. 2008. Commonwealth of Pennsylvania Coastal Resources Management Program Technical Guidance, Doc. 394-0300-001
- <sup>67</sup> Background: Coastal Zone Management Program. [www.dep.state.pa.us/river/about/background.htm](http://www.dep.state.pa.us/river/about/background.htm). (last accessed November 2009)
- <sup>68</sup> Funded Projects: Coastal Zone Management Program. [www.dep.state.pa.us/river/grants/prev-funded.htm](http://www.dep.state.pa.us/river/grants/prev-funded.htm) (last accessed November 2009)
- <sup>69</sup> PA-DEP. 2009 Coastal Zone Project Eligibility Criteria. p.12.
- <sup>70</sup> PA-DEP. 2010 Coastal Zone Project Eligibility Criteria. [www.dep.state.pa.us/river/grants/crm-grants/eligibility.htm](http://www.dep.state.pa.us/river/grants/crm-grants/eligibility.htm) (last accessed October 2009)
- <sup>71</sup> PA Code 25. Chap. 111. Stormwater Management-Grants and Reimbursements. 1998.
- <sup>72</sup> Lathia, Durla. 2002. Pennsylvania Stormwater Management Program., p.1
- <sup>73</sup> Lathia, Durla. 2002. Pennsylvania Stormwater Management Program., p.2
- <sup>74</sup> Murin, Ken. Presentation October 2009, Bailing Out Stormwater, Villanova.
- <sup>75</sup> Funding. Pennsylvania Department of Community and Economic Development. <http://www.newpa.com/find-and-apply-for-funding-funding-and-program-finder/index.asp>. (last accessed November 2009)
- <sup>76</sup> PA- Department of Community and Economic Development. 2009. H2O PA Water Supply, Sanitary Sewer and Storm Water Projects: Program Guidelines.
- <sup>77</sup> PA-Department of Community and Economic Development. Commonwealth Financing Authority Approved Projects—H2O PA Program. Approved July 14, 2009 by CFA Board.
- <sup>78</sup> PA-Department Of Community and Economic Development. Commonwealth of Pennsylvania Keystone Principles for Growth, Investment and Resource Conservation. <http://www.newpa.com/find-and-apply-for-funding/keystone-principles/index.aspx> (last accessed November 2009)
- <sup>79</sup> Pennsylvania Department of Conservation and Natural Resources. Shaping a Sustainable Pennsylvania: DCNR's Blueprint for Action.
- <sup>80</sup> PA DCNR. 2006. Tom Ridge Environmental Center now open at Presque Isle in Erie. <http://www.dcnr.state.pa.us/news/resource/res2006/06-0607-trecpi.aspx> (last accessed November 2009)
- <sup>81</sup> PA DCNR. Find a Grant Project. <http://www.dcnr.state.pa.us/brc/Keystone/Featuregrant.aspx> (last accessed September 2009)
- <sup>82</sup> PA DCNR. Introduction Green Principles. <http://www.dcnr.state.pa.us/brc/Keystone/indexgreen.aspx> (last accessed September 2009)
- <sup>83</sup> PA DCNR. 2009. Bureau of Recreation and Conservation. Environmental Scorecard for Grant Applicants.
- <sup>84</sup> USDA, Rural Development. 2008. Progress Report. p.31 <http://www.rurdev.usda.gov/pa> (last accessed November 2009)
- <sup>85</sup> USDA, Rural Development. 2008. Rural Development Financing Programs., p. 5. [http://rurdev.usda.gov/pa/program\\_summary\\_20080506.pdf](http://rurdev.usda.gov/pa/program_summary_20080506.pdf) (last accessed November 2009)
- <sup>86</sup> USDA, Rural Development. 2008. Utilities: Award Summary.
- <sup>87</sup> PA Environment Digest. 2009. History of Growing Greener. [http://www.growinggreener.com/index.php?option=com\\_content&view=article&id=58&Itemid=64](http://www.growinggreener.com/index.php?option=com_content&view=article&id=58&Itemid=64) (last accessed November 2009)
- <sup>88</sup> Ibid.
- <sup>89</sup> Pennsylvania Economy League. Issues PA: Growing Greener in Pennsylvania? <http://www.issuespa.net/articles/13836> (last accessed July 2008)
- <sup>90</sup> PA-DEP. 2008. Growing Greener Plus. Watershed & Flood Protection: Grant Application Package. p. 8.
- <sup>91</sup> PA-DEP. 2008. Growing Greener Plus. Watershed & Flood Protection: Grant Application Package. p. 9-11.
- <sup>92</sup> PA-DEP. 2009. Governor Rendell Announces More Than \$21.5 Million Investment in 144 Growing Greener Projects to Improve Water Quality. <http://www.ahs2.dep.state.pa.us/news-releases/default.asp?ID=5433&varQueryType=Detail> (last accessed September 2009) and PA-DEP. Project Summary. [www.dep.state.pa.us/grants/growgreen.asp](http://www.dep.state.pa.us/grants/growgreen.asp) (last accessed November 2009)
- <sup>93</sup> PA Environment Digest. 2009. Chesapeake Bay Foundation: Cuts Mean Potential Collapse of Environmental Oversight in Pennsylvania. <http://www.paenvironmentdigest.com/newsletter/default.asp?NewsletterArticleID=13784> (last accessed November 2009)
- <sup>94</sup> Swift, R. Special Interests spared from state budget cuts. CitizensVoice.com, October 18, 2009. <http://www.citizensvoice.com/news/special-interests-spared-from-state-budget-cuts> (last accessed November 2009)
- <sup>95</sup> Garland, L. July 6, 2009. Public comment letter to Barry Newman, PA-DEP on National Pollution Discharge Elimination System (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) General Permit (PAG-13) (draft permit)
- <sup>96</sup> Governor's Sustainable Water Infrastructure Task Force Report. (2008) Creating a Sustainable Solution for Pennsylvania.

## ABOUT AMERICAN RIVERS

American Rivers is the leading conservation organization fighting for healthy rivers so communities can thrive. American Rivers protects and restores America's rivers for the benefit of people, wildlife and nature. Founded in 1973, American Rivers has more than 65,000 members and supporters, with offices in Washington, DC and nationwide, including Pennsylvania.

Photo: Middle Saluda River



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