



# Clean Water Infrastructure

## The Cost of Inaction

By Kevin DeGood

October 30, 2013

We do not often think about what happens after it rains, after we run the dishwasher, after we flush the toilet, or after a business uses water for production. For most of us, bulky and unattractive water infrastructure, such as storm sewers and storage tanks, are conveniently buried underground—out of sight and out of mind.

Yet our policy and investment decisions regarding how we manage and treat polluted runoff—also referred to as stormwater—and wastewater deeply affect our environment, health, and economy. Clean water supports a \$50 billion per year recreation industry,<sup>1</sup> \$225 billion in coastal tourism,<sup>2</sup> and \$29 billion in commercial fishing,<sup>3</sup> as well as billions of dollars in manufacturing and support services. For every \$1 billion invested in clean water infrastructure, we create between 10,000 and 15,000 jobs.<sup>4</sup>

For too long, Congress has neglected water infrastructure, and the cost of inaction has been high. A few numbers will help bring the problem into stark relief.

According to the Environmental Protection Agency, or EPA, more than 72,000 miles of rivers are polluted by pathogens, which is a polite way of saying heavy bacteria loads resulting from the presence of human and animal waste.<sup>5</sup> Raising livestock produces 500 million tons of manure each year—approximately three times the waste produced by people.<sup>6</sup> More than 6 million acres of lake and reservoir water are polluted with mercury and polychlorinated biphenyls, or PCBs—much of it the result of industrial waste, which causes cancer and other immune system disorders—or they are fouled by nitrogen and phosphorus from farm runoff.<sup>7</sup> The same fertilizers that help crops grow also provide nutrients to algae, causing large blooms that drive down oxygen levels, which kill fish and other aquatic life.

Water pollution is often broken into two categories: wastewater and stormwater.<sup>8</sup> Wastewater comes from households, industries, and businesses on a daily basis from personal use and economic production. Local water authorities treat wastewater according to standards set by the federal government before it can be released back into the environment.<sup>9</sup>

Stormwater runoff, on the other hand, is generated when rain flows over land, streets, parking lots, and buildings (in intensively developed urban areas, these impervious surfaces can cover more than half of all land area), accumulating trash, chemicals, sediment, and other pollutants.<sup>10</sup> Polluted runoff is managed by two different types of systems: combined sewer systems and separated systems. In combined sewer systems, which are more common in older urban areas, stormwater runoff and wastewater are collected in the same pipes and then routed to a wastewater-treatment plant. In separated systems, stormwater and wastewater pipes are separate with wastewater going to a treatment plant and stormwater runoff released directly into local waters without treatment.

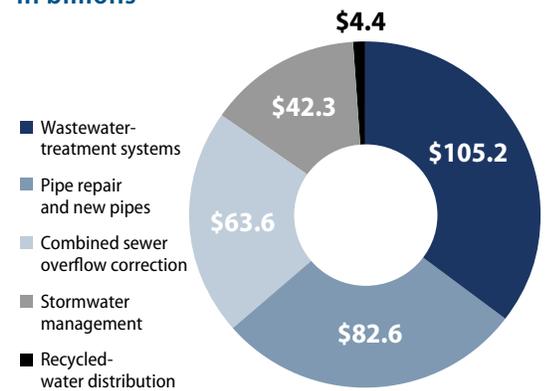
Heavy rains are particularly troubling for cities with older combined sewer systems. During heavy rains, these systems cannot handle the sudden rush of water, resulting in raw sewage overflowing into local waters or backing up in basements.<sup>11</sup> Combined sewer systems serve approximately 46 million people in the United States.<sup>12</sup> The EPA estimates that each year combined systems overflow between 23,000 times and 75,000 times,<sup>13</sup> releasing approximately 850 billion gallons of untreated sewage into rivers, lakes, bays, and streams.<sup>14</sup>

These disturbing statistics have real-world impacts. Research by the Centers for Disease Control, or CDC, shows that thousands of people are infected by water-borne illness each year at an economic cost of more than \$500 million in medical bills and lost productivity.<sup>15</sup>

Underinvestment and a lack of urgency in Washington, D.C., have created a massive backlog of repair and expansion projects nationwide, leading to a slow-motion environmental and infrastructure disaster. In 2008, the EPA conducted a comprehensive survey to determine wastewater-infrastructure needs over the next 20 years. The conservative estimate was \$298 billion.<sup>16</sup> In many cases, local residents are simply not able to cover the cost of repairing or upgrading old facilities through monthly fees. In many communities, water bills only cover drinking water and sewer services, leaving stormwater management critically underfunded.

Industry association data show that monthly charges for clean water infrastructure have outpaced inflation significantly in the past 25 years.<sup>17</sup> In many cases, public managers have stretched their bonding capacity to the limit and repeatedly called on system users to pay higher rates. Smaller communities are often at an even greater disadvantage due to difficulties accessing financing through the municipal-bond market.

**FIGURE 1**  
Infrastructure needs by category, in billions



Source: EPA, *Clean Watersheds Needs Report 2008*. (EPA, 2009), p. vi, figure ES-1.

---

## Achieving clean water goals will require strong leadership and support from Washington

Federal grants and loans have traditionally focused on improving water quality through upgrades to wastewater-treatment plants and enforcement of secondary treatment requirements.<sup>18</sup> This approach has succeeded in reducing pollution levels compared with what they were prior to enactment of the Clean Water Act in 1972. Unfortunately, secondary treatment is inadequate. Under current requirements, secondary treatment does not significantly remove harmful pollutants such as nitrogen, phosphorus, ammonia, metals, and other synthetic and organic compounds.<sup>19</sup>

The federal government must expand funding and low-cost financing with a clear focus on promoting advanced treatment and cost-effective and sustainable approaches to watershed management. At the same time, Congress should encourage water authorities to follow the lead of cities such as Philadelphia and Milwaukee and expand their focus beyond treatment to include green infrastructure, water efficiency, and conservation.

Innovative green-infrastructure projects mimic the natural water cycle by capturing or slowing the flow of rainwater to allow for ground infiltration or evaporation. Examples of green infrastructure include permeable pavements, green roofs, infiltration planters, tree boxes, and rainwater-harvesting systems. These approaches are highly cost-effective because they reduce the total volume of water in need of expensive treatment.

Both the House and Senate are advancing water-infrastructure legislation this year—though with very different approaches to the problem. The Senate Water Resources Development Act, S. 601, would establish a new water infrastructure-financing authority—the Water Infrastructure Finance and Innovation Authority, or WIFIA. The new authority would provide up to \$500 million in low-cost loans each year to eligible projects, including flood control, levees, dams, aqueducts, and energy efficiency, as well as drinking and clean water infrastructure.<sup>20</sup> Project sponsors would have to provide a 20 percent match with WIFIA financing covering no more than 49 percent of the total project cost. In addition, projects must have a total cost of at least \$20 million—\$5 million in rural areas.<sup>21</sup> The local match and project-size requirements may prevent many water agencies from seeking WIFIA financing, pushing the majority of funds to flood-control and retention projects.

The House Water Quality Protection and Job Creation Act, H.R. 1877, would provide additional financing through the existing clean water statewide-revolving funds, commonly referred to as the clean water SRFs. Under this approach, the EPA administrator would provide financing directly to the statewide-revolving fund, which would in turn lend to local projects.<sup>22</sup> The House bill authorizes up to \$10 billion per year in financing exclusively for clean water infrastructure with no project-cost minimum or local match requirement.<sup>23</sup> The measure also expands eligible projects to include more green-infrastructure and energy-efficiency programs and extends repayment from 20 years to 30 years.<sup>24</sup>

In addition to expanding financing, Congress should allow states to forgive a larger share of revolving-fund loans, increase the share of funds dedicated for green infrastructure, and reward states and regions that prioritize watershed management, water efficiency and reuse, and lower energy consumption.

In short, Congress can no longer afford to view clean water through the narrow lens of treatment facilities alone. Achieving clean water goals requires embracing mitigation efforts and best watershed-management practices along with advanced treatment. The most cost-effective gallon of clean water is one that never has to be treated because of water use-efficiency gains or green infrastructure that captures stormwater before it can produce harm.

This year, Congress has a chance to advance legislation that will strengthen our economy and better protect the environment and public health. It should embrace this opportunity.

## Philadelphia: “Green City, Clean Waters” program

Like many older cities, Philadelphia, Pennsylvania, has an aging combined stormwater and wastewater system that often overflows after a heavy rain, discharging untreated sewage into the Delaware and Schuylkill Rivers. These discharges exceeded both state and federal clean water-pollution standards.<sup>25</sup> Working with the state and federal governments in the past few years, the Philadelphia Water Department developed a truly innovative approach to achieving clean water goals. The resulting plan, called “Green City, Clean Waters,” is one of the largest green-infrastructure programs ever created.<sup>26</sup> When fully implemented over the next 25 years, the plan will transform the city into a model of best practices for preventing harmful sewer overflows.

Historically, Philadelphia’s approach to managing stormwater was based on building pipes, storage facilities, and treatment plants. As the city grew, development covered more and more greenfield land—or undeveloped land—with buildings, roads, and other impervious surfaces. Underneath, the city’s water department built an elaborate series of facilities that combined stormwater and wastewater from homes and businesses in one system. Today, the Philadelphia Water Department operates and maintains 3,000 miles of pipes, storm drains, and storage chambers, along with three treatment plants. The combined sewer system covers 60 percent of the City of Philadelphia, or approximately 64 square miles.<sup>27</sup>

Unfortunately, the combined system cannot handle heavy rains, which cause untreated discharges through manhole covers and at 164 different discharge points within the city—often referred to as outfalls.<sup>28</sup>

Philadelphia recently entered into two formal agreements to address its clean water needs. In June 2011, the city negotiated an agreement with the Pennsylvania Department of Environmental Protection that establishes a long-range plan to improve water quality through green infrastructure. In addition, the city signed a partnership agreement with the EPA in April 2012.<sup>29</sup>

The city’s water-quality improvement plan calls for investing \$2.5 billion over the next 25 years with 67 percent directed to green infrastructure.<sup>30</sup> A major element of the plan is the removal or repaving of many hard surfaces such as alleyways, driveways, and parking lots with materials that are porous and allow stormwater to filter back into the ground. In fact, one green acre of land can remove the equivalent of 27,000 gallons of stormwater that would otherwise flow into the system.<sup>31</sup> It is estimated that, over the next 25 years, the program will convert 9,500 acres of hard surfaces into permeable surfaces that will filter water at a rapid rate.<sup>32</sup>

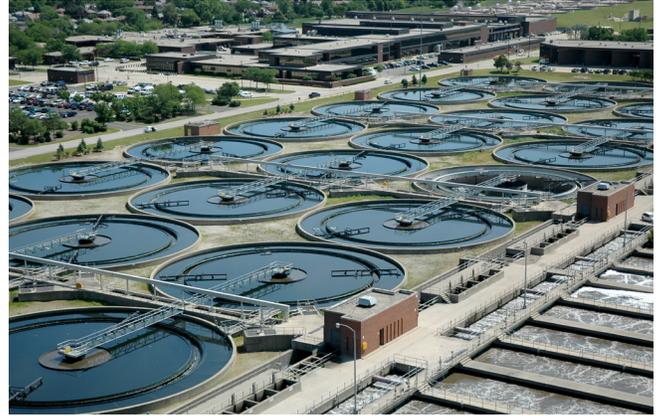
In only a short time, the program has yielded impressive results. During the past year, the stormwater management and green infrastructure have prevented an estimated 9.1 million gallons of untreated discharge from entering local waters.<sup>33</sup>

### Stormwater discharge



Source: Flickr/mikecogh

### Typical wastewater-treatment plant



Source: Metropolitan Water Reclamation District of Greater Chicago

### Alleyway repaved with porous pavement



Photo courtesy of the Philadelphia Water Department

### Green traffic triangle



Photo courtesy of the Philadelphia Water Department

*Kevin DeGood is the Director of Infrastructure Policy at the Center for American Progress. His work focuses on how highway, transit, aviation, and water policy affect America's global competitiveness, access to opportunity for diverse communities, and environmental sustainability. Kevin holds a master of public policy degree from the University of Southern California and a bachelor of arts from the University of North Carolina at Chapel Hill. He is the author of Thinking Outside the Farebox: Creative Approaches to Financing Transit Projects.*

---

## Endnotes

- 1 Water Infrastructure Network, “Clean and Safe Water for the 21st Century: A Renewed National Commitment to Water and Wastewater Infrastructure” (2000).
- 2 James R. Houston, “The economic value of beaches—a 2013 update,” *Shore & Beach* 81 (1) (2013): 3–11.
- 3 National Oceanic and Atmospheric Administration, *Economic Statistics for NOAA* (U.S. Department of Commerce, 2006).
- 4 Claudia Copeland, Linda Levine, and William J. Mallett, “The Role of Public Works Infrastructure in Economic Recovery” (Washington: Congressional Research Service, 2011), available at <http://www.fas.org/sgp/crs/misc/R42018.pdf>.
- 5 U.S. Environmental Protection Agency, “National Water Quality Inventory: Report to Congress, 2004 Reporting Cycle” (2009), p. 15, figure 2.
- 6 U.S. Environmental Protection Agency, “Protecting Water Quality from Agricultural Runoff” (2005), available at [http://www.epa.gov/owow/nps/Ag\\_Runoff\\_Fact\\_Sheet.pdf](http://www.epa.gov/owow/nps/Ag_Runoff_Fact_Sheet.pdf).
- 7 U.S. Environmental Protection Agency, “National Water Quality Inventory,” p. 18, figure 5.
- 8 Another important source of water pollution is air pollution. Domestic, industrial, and agricultural activity creates air pollution—especially mercury—that often settles onto land and in water through a process known as atmospheric deposition. Many water bodies also contain legacy pollutants from past production activities or unregulated dumping. See U.S. Environmental Protection Agency, “Air Pollution and Water Quality,” available at [http://water.epa.gov/lawsregs/lawguidance/cwa/tmdl/airdeposition\\_index.cfm](http://water.epa.gov/lawsregs/lawguidance/cwa/tmdl/airdeposition_index.cfm) (last accessed October 2013).
- 9 The EPA does not have statutory authority to regulate non-point source pollution or ground water. Furthermore, of the more than 20,000 new chemicals that have been developed in the past 30 years, the EPA has health-impact data on only 15 percent. For more information, see K. William Easter and Yoshifumi Konishi, “Estimating Economic Health Costs of Not Controlling Toxic Water Pollution” (St. Paul, MN: University of Minnesota, 2005), available at <http://ageconsearch.umn.edu/bitstream/25768/1/cp060227.pdf>.
- 10 U.S. Environmental Protection Agency, “Stormwater Program,” available at [http://cfpub.epa.gov/npdes/home.cfm?program\\_id=6](http://cfpub.epa.gov/npdes/home.cfm?program_id=6) (last accessed October 2013).
- 11 Deteriorating infrastructure, including broken pipes, blockages, and failed pumping stations, can also cause overflows—even in systems that separate stormwater and wastewater (often referred to as sanitary-sewer systems).
- 12 U.S. Environmental Protection Agency, “FY08–FY10 Compliance and Enforcement National Priority: Clean Water Act, Wet Weather, Combined Sewer Overflows” (2007).
- 13 U.S. Environmental Protection Agency, “Sanitary Sewer Overflows and Peak Flows Frequently Asked Questions,” available at [http://cfpub.epa.gov/npdes/faqs.cfm?program\\_id=4](http://cfpub.epa.gov/npdes/faqs.cfm?program_id=4) (last accessed October 2013).
- 14 U.S. Environmental Protection Agency, “FY08–FY10 Compliance and Enforcement National Priority.”
- 15 Centers for Disease Control and Prevention, “Waterborne Diseases Could Cost over \$500 Million Annually in U.S.,” Press release, July 14, 2010, available at <http://www.cdc.gov/media/pressrel/2010/r100714.htm>.
- 16 U.S. Environmental Protection Agency, “Clean Watershed Needs Survey: 2008 Report to Congress” (2008), p. 5.
- 17 National Association of Clean Water Agencies, “2012 Service Charge Index” (2013).
- 18 U.S. Environmental Protection Agency, “Secondary Treatment Standards,” available at <http://cfpub.epa.gov/npdes/techbasedpermitting/sectreat.cfm> (last accessed October, 2013).
- 19 U.S. Environmental Protection Agency, “Clean Watershed Needs Survey,” Appendix J, J-2.
- 20 *Water Resources Development Act of 2013*, S. 601, 113th Cong., 1st sess. (Government Printing Office, 2013).
- 21 *Ibid.*
- 22 *Water Quality Protection and Job Creation Act of 2013*, H.R. 1877, 113th Cong., 1st sess. (Government Printing Office, 2013).
- 23 *Ibid.*
- 24 *Ibid.*
- 25 U.S. Environmental Protection Agency, “Administrative Order for Compliance on Consent” (2012), available at [http://www.phillywatersheds.org/doc/EPA\\_Signed\\_AOCC.pdf](http://www.phillywatersheds.org/doc/EPA_Signed_AOCC.pdf).
- 26 Larry Levine, comment on “Philadelphia Gains Approval of Landmark Green Infrastructure Plan, a Model for Smart Water Practices Nationwide,” The SWITCHBOARD Blog, comment posted June 1, 2011, available at [http://switchboard.nrdc.org/blogs/llevine/philadelphia\\_gains\\_state\\_appro.html](http://switchboard.nrdc.org/blogs/llevine/philadelphia_gains_state_appro.html) (last accessed October, 2013).
- 27 Philadelphia Water Department, “Green City, Clean Waters” (2012), available at [http://www.greenfestphilly.org/sites/default/files/files/2012\\_GCCW\\_Factsheet.pdf](http://www.greenfestphilly.org/sites/default/files/files/2012_GCCW_Factsheet.pdf).
- 28 *Ibid.*
- 29 U.S. Environmental Protection Agency, “Administrative Order for Compliance on Consent.”
- 30 Philadelphia Water Department, “Green City, Clean Waters.”
- 31 Philadelphia Water Department, “Implementation and Adaptive Management Plan” (2011), available at [http://phillywatersheds.org/ltcpu/IAMP\\_body.pdf](http://phillywatersheds.org/ltcpu/IAMP_body.pdf).
- 32 *Ibid.*
- 33 Philadelphia Water Department, “Stormwater Management Program Annual Report” (2013), available at [http://phillywatersheds.org/doc/CSO-Stormwater\\_FY13\\_Annual\\_Reports-FINAL\\_Appendices.pdf](http://phillywatersheds.org/doc/CSO-Stormwater_FY13_Annual_Reports-FINAL_Appendices.pdf).