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**The Use of Public-Private Partnerships for Stormwater
Management**

Jennifer Biddle, PhD

Center for Environmental Policy

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American University

biddle@american.edu

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Introduction

For more than 50 years, U.S. command-and control regulations have sought to remedy environmental problems associated with the degradation of surface waters. While the Clean Water Act of 1970 grants the U.S. Environmental Protection Agency (EPA) authority to regulate point source pollution (e.g., emissions discharges by factories and operating plants), it does not confer the Agency authorization to control nonpoint source pollution (e.g., stormwater runoff). However, nonpoint source pollution poses significant environmental risk to surface water. The Environmental Council of the States (ECOS) indicates that nonpoint source pollution is the nation's primary cause of water quality impairment in that it accounts for 97 percent of water pollution (ECOS, 2010). ECOS also identifies the "universe of nonpoint source contributors to impaired streams, creeks, rivers, lakes and waterbodies [as being] too big for any single state or federal agency to manage and fund." As a consequence, many policy makers are turning to collaborative governance approaches, and in particular, public-private partnerships (PPPs) to address complex, environmental problems (Imperial, 2005; Lubell, et al, 2002). This trend is most evident in management of watersheds. A broad range of research has highlighted the important role collaboration plays within watershed governance systems (Imperial, 2011, 2005; Thomas and Koontz, 2011; Hardy and Koontz, 2008; Ferreyra and Beard, 2007; Bidwell and Ryan, 2006; Sabatier, et al. 2005; Steelman and Carmin, 2002; and Genskow and Born, 2001). EPA's "watershed approach" is an example of a PPP that focuses on the highest priority problem within a hydrologically-defined geographic area and considers both the ground and surface water flows.

PPPs can be defined broadly to include a range of public-private interactions intended to serve public purposes, including technical assistance, grants, and cost-sharing, that combine market incentives from the private sector with political authority from the public sector, and innovation and public support from the nonprofit sector, to provide public goods or fulfill a societal need (Koontz and Thomas, 2011; Skelcher, 2007; Zarco-Jasso, 2005). They fill a niche in traditional bureaucratic structures by creating a forum in which diverse interests can negotiate mutually beneficial rules to manage an issue. PPPs have the potential to achieve larger-scale and more holistic goals that may not have been otherwise feasible within the purview of a single organization working alone (Hardy and Koontz, 2008; Koontz, et al., 2004; Ferreyra & Beard, 2007; Lubell, et al, 2002; Imperial, 2005).

PPPs represent a hybrid approach in the provision of public goods and societal benefits. They are a type of cross-sector collaboration whereby stakeholders create temporary collaborative alliances in the pursuit of a common goal to come to an acceptable solution (Wood and Gray, 1991; Gray, 1989). PPPs typically involve pairings of the following entities: 1) government, 2) for-profit firms, and 3) non-for-profit organizations. There are a variety of types of PPPs depending on the level of interaction and interdependencies among these entities. The composition of these partnerships has been found to affect the outcome (Moore and Kootnz, 2003; Bidwell and Ryan, 2006; Margerum, 2008), thereby making the choice of whom to partner with an important one.

General assumptions on the role and motive of these entities affect their interactions. For example, the traditional and assumed role of government is to define and promote achievement of public mission in a manner that retains the confidence of the public. Whereas, for-profit firms are expected to competitively produce goods and services demanded by customers in a manner that generates a favorable return on investment for shareholders and the capital required for the future. Non-profit organizations are expected to carry out the role of meeting worthy social needs in a manner that is compatible with broader societal goals, but within their own financial constraints. The challenge for PPPs is to build productive relationships between these entities while carrying out these traditional and assumed roles. Government must not "harm" for-profit firms in their quest to provide public services to citizens. For-profit firms are expected to be socially responsible and "good" corporate citizens in the global market. Non-profit organizations strive to produce innovative means for addressing social needs based on the assumption that government and/or business will reward them with financial support for their programs (Zarco-Jasso, 2005).

The lines between these entities' traditional roles are becoming blurred in the face of market changes and increasing interdependencies and interactions. PPPs represent the adaptation of governance structures to combine the best features of market and bureaucratic designs (Zarco-Jasso, 2005). PPPs offer government the potential to circumvent the dangers of bureaucratization, corruption, and inefficiencies and shield for-profit firms from the dangers of monopoly profits and self-enrichment (Zarco-Jasso, 2005).

Characteristics of PPPs and Key Stakeholders for Stormwater Management

Stormwater runoff is a growing concern for our nation's waters, especially for the 772 cities with combined sewer systems¹ (USEPA, 2008). Stormwater is the underlying cause of one of the most significant and the most expensive urban wet weather issue-combined sewer overflows (CSOs) (Mehan, 2010). The 1987 Amendments to the Clean Water Act authorized stormwater regulation through the National Pollution Discharge Elimination System (NPDES). The NPDES program regulates industrial activities and municipal separate storm sewer systems (MS4), mostly through local government ordinances to control roads and building codes. However, as the last forty years have shown, we cannot permit our way out of this problem. Stormwater runoff poses significant ecological impacts to receiving waterbodies and public health concerns to surrounding communities². This requires an integrated systems approach to solve the various problems related to stormwater runoff, including water quality, water supply,

¹ Approximately 772 cities with combined sewer systems are located primarily in the Northeast, Great Lakes regions, and the Pacific Northwest (USEPA, 2008).

² Contaminants found in stormwater have the potential to alter a waterbody's chemistry, often exceed water quality standards, and affect both aquatic and human health. Contaminants include: heavy metals, nutrients, pathogens, sediment, surfactants, petroleum byproducts, persistent organic compounds (Mallin et al, 2009).

flooding, and repairs to infrastructure. It also relies on an integrated system perspective and management.

A growing trend by municipalities is to partner with private and non-profit entities embracing a more holistic water infrastructure that includes a combination of traditional man-made (gray) water and wastewater infrastructure, and natural watershed systems (green infrastructure) in an effort to meet future water demands and social, economic and environmental challenges (Mehan, 2010). Several features of PPPs increase the applicability of this approach for managing stormwater sustainably (Imperial, 2011). Among these are that it:

- applies a holistic and integrated or systems perspective;
- incorporates public participation and stakeholder involvement into decision making;
- depends on scientific data for developing policies and programs;
- coordinates local policies and programs to improve performance; and
- allows for meaningful interactions among stakeholders.

The key feature of PPPs is the people involved. However, difficulties lie not only in getting to the table the "right" people with the knowledge to make good decisions, but in keeping them there (Vernice Miller-Travis, 2011)³. The importance of diverse participation and cross-sector collaboration is stressed in the literature (Bidwell and Ryan, 2006; Bryson et al, 2006; Crosby and Bryson, 2005; Moore and Koontz, 2003). Heterogeneous partnerships involving a mixture of non-state and government actors were found to be more likely to develop an action plan and to implement projects aimed at improving the state of local watersheds (Bidwell and Ryan, 2006).

From a planning and decision-making perspective, involving a range of stakeholders in PPPs may allow for better integration of stormwater protection with local strategies for economic development, community services, environmental justice, and improved quality of life. Below is a list of the types of organizations typically involved in PPPs, with specific examples of those applicable to stormwater management.

- Government-** *U.S. EPA Office of Water, governors, mayors and city, county and regional councils of government, officials from parks and recreation, public works, housing and highway departments.*
- Business-** *homebuilders, real estate developers, lawn and fertilizer businesses, pavement manufactures, and trade associations.*
- Community-** *property owners, local environmental non-profit and non-governmental organizations, and volunteer watershed groups.*
- Academia-** *land grant University Extension Programs and research consortiums.*
- Financial sector-** *banks and local land trusts.*

³ Paraphrased comment made as a panelist at an Institute of Environmental Conflict Resolution and American University co-sponsored "Collaborative Governance Roundtable" event.

The nature of bureaucracy is deliberate and cautious; therefore pairing with an entity that has the ability to adapt quickly to uncertainties and innovate would be of great benefit. For-profit business firms gain good public relations, technical assistance and sometimes regulatory incentives through partnerships with the public sector. In turn, they provide financial support for non-profit and community-based projects. There are a whole host of environmental and health benefits related to green infrastructure practices for the community, including noise reduction, aesthetics, improved air quality, reduction of heat island effect, reduced stream channel erosion and reduced costs related to restoring and stabilizing stream channels, sewage lines, and bridge abutments. Academic institutions provide a wealth of information on most current technologies and theories to private and public partners. They present a slightly different dynamic from non-profit organizations due to their neutral status and objective perspective.

The literature suggests the following characteristics to be important to the success of PPPs: diversity in stakeholders and the various roles of the involved government agencies (Margerum, 2008; Bidwell and Ryan, 2006; Bryson et al., 2006; Crosby and Bryson, 2005; Moore and Koontz, 2003); trust among stakeholders (Mandarano, 2008; Ansell and Gash, 2007; Bryson et al., 2006; Thomson, et al., 2007; Leach and Sabatier, 2005), development of social capital (Leach and Sabatier, 2005; Leach et al, 2002; Jones and Burgess, 2005; Dietz et al, 2003), clear and common goals (Biddle, 2011; Wood and Gray, 1991); technical and financial support (Biddle 2011; Hardy and Koontz, 2008; Ferreyra and Beard, 2007; Bidwell and Ryan, 2006; Imperial, 2005; Steelman and Carmin, 2002; Lubell, et al., 2002; Born and Genskow, 2001; Wood and Gray, 1991), and the establishment of governance rules and shared norms (Gilbert, 2006; Wood and Gray, 1991).

My experience and anecdotal information from colleagues suggests the need for strong institutional commitment, effective leadership from local non-profit or non-governmental organizations, community and market support for innovative technologies, and a regulatory context that encourages creativity and investment. The case studies described later in this paper offer further anecdotal support for the importance of these characteristics.

Potential Partnership Outputs and Outcomes

It is important to define outputs and outcomes as they are often confused. The wide range of policy tools for enabling and encouraging public-private partnerships, including grants, contracts, and technical assistance, makes it difficult to distinguish outputs from outcomes. However, choosing the appropriate output and outcome measures is essential for accurately assessing the performance of PPPs (Koontz, and Thomas, 2011). Koontz and Thomas (2011) define outputs as the products and services delivered by a government program, while outcomes are the events or conditions that occur outside the program.

Listed below are potential outputs produced by PPPs:

- watershed plan describing the sources of impairment and plans to mitigate sources of impairment through goal setting and community partnerships;
- water quality report on the analysis of ambient water quality and sources of impairment;
- site designs that incorporate green infrastructure and Low Impact Development (LID) practices
- educational brochures and workshops on design and function of green infrastructure practices and importance of sustainable stormwater management; and
- demonstrations and volunteer installations of green infrastructure and LID practices highlighting the community benefits

Listed below are potential outcomes that may result from PPP outputs:

Water quality

- reduced stormwater velocity, pollutant loads (proactive stormwater ordinances call for these);
- improved water quality (state/federal policies); and reduced flooding.

Infrastructure

- reduced CSO events -- marginal impacts; and reduced stress on existing infrastructure.

Community

- improved aesthetics via green infrastructure; and
- increased community support and participation for collaborative, sustainable stormwater management.

Economy

- increased buy-in and implementation from business community;
- mainstreaming of green infrastructure practices in new land development projects; and
- economic savings for reduction of need for gray infrastructure repairs and maintenance.

Government

- stormwater polices that promote innovation and reward creative problem-solving.

Case Study Examples of Successful PPPs

Case Study 1: Houston Land/Water Sustainability Forum's LID Competition in 2007

[Houston's Land/Water Sustainability Forum](#), which consists largely of businesses, nonprofits and local government, was formed to educate and encourage the adoption of sustainable practices, such as Green Infrastructure and LID in order to enhance, not

diminish their community in the face of rapid growth and development⁴. Recognizing that successful, sustainable design requires a holistic approach and collaborative effort between the design, construction and regulatory professionals involved, the Forum created a competition to develop the best LID project(s) in an effort to publicize the issue and increase the comfort of professionals to propose LID projects to their clients. [The LID Design Competition](#) sought to accelerate the adoption and implementation of these practices by providing a hands-on learning experience to design, construction and development professionals in the Houston area. And at the same demonstrating the economic, environmental and marketing benefits available to local design professionals, and to the development, civic and regulatory communities when they work together to adopt sustainable site practices. Over 230 design professionals representing 42 firms, including, architects, builders, civil engineers, construction consultants, environmentalists, hydrologists, landscape architects, land planners, transportation engineers, irrigation consultants and others competed in the competition. The participants were composed into integrated design teams and chose one of the three categories of Design Challenges: 1) suburban residential development, 2) urban re-development, and 3) green roadway project. The submitted design proposals were judged on reductions in volume, and pollutant loadings and cost-effectiveness. The winners won a cash prize of \$15,000 provided by the following private entities -- Houston Chapter of the American Society for Civil Engineers, the Architecture Houston Foundation and Mischer Investments. This partnership represents a great example of an innovative way to get people rethinking stormwater infrastructure that ultimately led to the adoption of the Forum's *LID Design Guide* by county officials, as well as expedition of LID-based projects in the Houston area.

Case Study 2: Philadelphia's new parcel-based billing and stormwater crediting program

The Philadelphia Water Department (PWD) developed the [Green City, Clean Waters](#) plan, recently approved by state regulators to satisfy Clean Water Act mandates, requires the city to retrofit nearly 10,000 impervious acres (at least one-third of the impervious area served by Philadelphia's combined sewer system) to manage an inch of runoff onsite, relying on green infrastructure for billions of gallons of required sewage overflow reductions (NRDC, 2012). The plan calls for the investment of at least \$1.67 billion of public funds in green infrastructure, while seeking to leverage substantial investments from the private sector (Szalay, 2011). Under the PWD program, a range of practices including bioretention systems, green roofs, subsurface detention systems, and extended detention basins can earn stormwater credit. Philadelphia's stormwater fee and credit system provides opportunities for private investment in stormwater retrofits in that city. This approach will not only reduce the city's reliance on the construction of costly underground infrastructure, but will beautify city neighborhoods as well.

⁴ White paper written by Design Competition White Paper Subcommittee describing Houston Land/Water Sustainability Forum's 2007 Low Impact Development Design Competition.

North American Street, historically one of the city's major thoroughfares, has become rundown and desolate in recent decades. Plans to retrofit the street with curbside bioretention systems and tree trenches offer the potential to effectively manage street runoff while also making the corridor more attractive to infill development. However, unlike traditional green streets projects, the North American Street project would also set aside storage capacity to treat private runoff. Private businesses along the corridor could elect to either pay their stormwater fee or, alternatively, route their runoff into a stormwater management practice located within the public right of way (Szalay, 2011). PWD staff are working out the details of the cost-share agreement with interested commercial investors. However, the North American Street is an example of how public-private partnerships could provide more flexibility for small-property owners looking to benefit from stormwater crediting.

Case Study 3: Spa Creek Conservancy Voluntary Watershed Projects and Stewardship Program

[Spa Creek Conservancy](#) is an environmental nonprofit dedicated to restoring and protecting Spa Creek urban watershed in Annapolis, Maryland. Continued growth and development pose the greatest threats to health of the watershed, and correspondingly the Chesapeake Bay, into which Spa Creek drains. The Conservancy represents a multitude of PPPs between local and state government, private businesses, community and civic groups, and local residents depending on the project. The Conservancy has implemented numerous projects, including a trash clean up under the bridge near the Annapolis Yacht Club, installation of rain gardens at numerous sites, including Heritage Baptist Church, along Lincoln Drive, near the Weems-Whalem and Bates Middle School athletic complex, and at the street entrance to the Chesapeake Children's Museum, as well as other projects involving PPPs for stormwater management⁵.

In 2009, Spa Creek Conservancy launched the Spa Creek Stewardship with funding support from the Chesapeake Bay Trust and in partnership with the Center for Watershed Protection. The program encourages local businesses and organizations to become part of the solution, not the problem, through partnerships that assist them in positively influence the water quality of the Spa Creek watershed. To address the large impervious footprints associated with automobile dealerships, the Conservancy partnered with Annapolis Hyundai and Rich Morton Lincoln Mercury Automobile Dealerships to assist them in developing sustainable strategies for controlling stormwater runoff on their properties. In addition, the dealerships are featured on the Conservancy website where they are heralded as stewards to Spa Creek.

Summary

Although quite different in stakeholder composition and structure, these case study examples have some commonalities: 1) partnership outputs are carried out at the local level within a watershed or municipality; 2) clear and common goals are shared by

⁵ More information on Spa Creek Conservancy Projects can be found at: <http://www.spacreek.org/projects.htm#raingarden>.

partners; and 3) resulting outcomes provide mutual benefits to partners. In addition, these examples provide anecdotal evidence in support of the importance a strong institutional commitment, such as effective leadership from local non-profit or non-governmental organizations, community and market support for innovative technologies, and a regulatory context that encourages creativity and investment.

Effective leadership from Houston's Land/Water Sustainability Forum inspired innovation in their community with regards to stormwater management. Not only did the competition provide hands-on experience for participants, which increased their understanding and confidence in these practices, it also transformed perspectives on stormwater infrastructure throughout the entire community. This led to the adoption of new guidance manuals by county officials that reward creativity through the expedient of the permitting process in favor of projects incorporating LID designs. Houston's LID Design Competition is being replicated in Northern Texas and Virginia.

The Philadelphia Water Department's strong institutional commitment and long-term vision to green infrastructure fortified its decision to impose a hefty and unpopular stormwater fee upon property owners. This is a classic example of a top-down approach of mandating change through regulation. While it is too soon to tout this example as a complete success, the results so far are encouraging. In addition to reducing the stress on their aging infrastructure and restoring "swimmable" designations to surrounding rivers, Philadelphia is revitalizing its neighborhoods and reestablishing a "sense of place" within its community. Increasing entrepreneurial activity related to stormwater mitigation and private investment in innovative stormwater technologies fans the flames of proponents of its Green Streets, Clean Waters Program.

Lastly, the Spa Creek Conservancy is an example of grass-roots, community-driven partnerships via an effective non-profit organization that plays upon the heart strings of its community and its inhabitants love for their local resource -- the Chesapeake Bay. The Conservancy's Stewardship Program highlights the importance of a common goal shared by partners. That goal is to restore the Bay, which is exactly what Spa Creek Conservancy sets out to do. The sheer number of projects hints at its success, but the diversity and dedication of its partners further suggest a model to follow for PPPs for stormwater management.

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