Introduction

Interdependencies between local jurisdictions are becoming more obvious (we all are downstream from somebody); state and federal authorities are extending permitting requirements to additional communities; scientists are predicting more extreme storm events as a result of atmospheric warming; and all of these changes have emerged in the context of growing anti-tax/anti-government sentiments and a political system which experiences difficulties in fixing long-run problems, such as funding for the maintenance and expansion of stormwater infrastructure.

Why What Local Governments Do about Stormwater is Important

Stormwater services have long contributed to the health and welfare of people living in communities, from small towns to large cities. The American federal system of governance invests significant land-use authority, including that for stormwater management, in local jurisdictions. Additional decentralization has occurred in some jurisdictions because private homeowners' associations have been given responsibility, with local government oversight, for maintaining stormwater improvements. Since their beginning, local governments have provided protection against stormwater floods, first by digging ditches and then by installing pipes, and often the ditches and pipes discharged directly into streams and rivers; many still do.

Your jurisdiction likely owns land. State and federal authorities might also own properties within your boundaries, but most land in most jurisdictions in the Chesapeake Bay Watershed is held by private property owners. Likewise, most land transactions – the purchase, sale, and use of land for places to live, work, and play – are accomplished via the private market. With extensive private land ownership and ubiquitous market transactions for land use, the questions for local government staff are:

- Why should government be in the business of providing stormwater services?
- Why not leave stormwater management exclusively to the market?

The answers to these questions are:

- **Unless government provides stormwater services, those services will not be made available to the extent that people and nature demand them.**
- **And unless <u>your</u> government provides them, those stormwater services will not reflect the unique social and political relationships characterizing your community.**

Private property owners will make reasonable efforts to protect their assets against potential ravages of stormwater by locating buildings on dry areas, grading the ground away from structures, and installing and maintaining roofs, gutters, and downspouts. They may minimize their use of lawn fertilizers in the recognition that stormwater runoff often carries nutrient pollutants into bodies of water. Stormwater management across a built community, even a small town, involves, however, a large system of interdependencies across parcels of land; how one property owner behaves about stormwater can and likely will affect his neighbors. Additionally, no private property owner has an economic incentive to provide stormwater services for his neighbors; this is so because there is no cost-effective way to exclude people who would enjoy privately-produced stormwater services without having paid for them.

Stormwater services are public goods, and unless government provides or subsidizes them, most likely a community will suffer the consequences of their absence.

Your local jurisdiction, moreover, is the primary government provider of stormwater services. Local governments are creatures of their states, and they are subject to national stormwater regulations under the U.S. Clean Water Act (CWA) of 1972 and later amendments. The American federal system of government recognizes for purposes of governing land use, however, that local jurisdictions are in a unique position to understand the physical and social qualities of a place, including:

1. Its system of surface and ground water that has been afforded by nature;
2. The presence and quality of existing stormwater infrastructure;
3. Who is responsible for maintaining that infrastructure; and,
4. Local citizen's political preferences for what local public services should be provided and how they want to pay for those services.

As a local public official, therefore, you are significantly and uniquely responsible for stormwater services and their finance.

Changing Stormwater Values, Services, and Organizational Forms

The shift underway regarding stormwater management reflects our increasing awareness of the environmental consequences of stormwater – its impacts and its benefits, both existing and potential. Changing values about stormwater are based on progress in science. Most notably, the U.S. Environmental Protection Agency conducted a broad, national study of stormwater in the late 1970s and early 1980s (EPA, 1983). That study, known as the Nationwide Urban Runoff Program, found high levels of heavy metals, coliform bacteria, and nutrients in urban stormwater. The study indicated also that various Best Management Practices (BMPs) – particularly detention basins, wet basins, and wetlands – are effective means for reducing stormwater pollutants.

Local governments are responding to new values forged by improved science by removing pollutants prior to discharge and by using stormwater to protect local ecosystems, recharge groundwater, enhance parks and recreation sites, and increase local landscape aesthetics. To ditches and pipes, local governments are adding networks of open spaces, known as ***green infrastructure***. Such networks – which include combinations of forest preserves, parks, rain gardens, wetlands, green roads, roofs and parking lots, and other open spaces – are being used, increasingly, to manage stormwater and to improve its quality. Managing stormwater by green infrastructure implies changing how local governments are organized and how they relate to outside individuals and groups: jurisdictions are adding ecologists, planners, economic developers, and other types of local government employees to their traditional corps of stormwater engineers, and they are partnering with neighboring jurisdictions, land developers, private engineering firms, non-profit organizations, and individual citizens to create stormwater management networks. See ***Appendix A*** for a more thorough description of the impact of green infrastructure on the stormwater financing process.

These changes in values, additions to services, and reforms in organizations and relationships are occurring in the context of growing urbanism in the United States. While not exclusively an

urban issue, stormwater is primarily a problem in built communities. The urban population of the U.S. is now more than 82 percent of the total population and is growing at a rate 1.3 percent per year (United Nations, 2011). The rate of land conversion, from rural to urban uses, is exceeding, moreover, the rate of urban population growth. Using satellite maps, researchers have estimated that in the Chesapeake Bay Watershed, for the period 1990 to 2000, impervious surface areas grew by 61 percent, and that growth came at the expense of natural resource lands: forests; agricultural property; and wetland areas (Jantz, Goetz and Jantz, 2005).

Legalities

Changing scientific knowledge and community values are the bases for evolving government regulations on stormwater. Congress passed the CWA in 1972. In 1990, based on the Nationwide Urban Runoff Program findings, the Act was amended to regulate stormwater in larger local jurisdictions: communities, that is, with populations greater than 100,000. These larger jurisdictions are known as Phase I Communities. In 1999 the regulations were extended to smaller jurisdictions known as Phase II Communities. The extension of regulations to Phase II communities included many more jurisdictions. In the State of Maryland, for example, ten large and medium-size jurisdictions are Phase I locales, whereas approximately 60 cities and towns, with populations between 1,000 and 100,000, are Phase II jurisdictions (Maryland Department of the Environment, 2013).

The EPA regulates stormwater through the National Pollutant Discharge Elimination System (NPDES), which addresses discharges from three potential sources: municipal separate storm sewer systems (MS4s), construction activities, and industrial activities. A MS4 is a conveyance or system of conveyances that is owned by a public entity – such as a township, municipality, or county – which collects or conveys stormwater. In order to discharge stormwater into their MS4s, Phase I and Phase II Communities must obtain, usually, a permit. Permits for Phase I jurisdictions require site-specific technical control measures that are relatively more intensive than are measures required in permits for Phase II jurisdictions (EPA, July 2013). Most states are authorized to be the permitting authority across their jurisdiction.

Phase II control measures include six requirements – also known as Minimum Control Measures (MCMs) – of every jurisdiction seeking a permit. BMPs are required for each MCM, as are: (1) measurable goals; (2) a timeline, including interim milestones and descriptions of when measures will be taken; and (3) the designation of the person or persons responsible for implementing the stormwater program. The MCMs are:

1. **Public education and outreach**. Communities must implement, with BMPs, a public education campaign to distribute education materials or otherwise to reach the public to describe the effects of stormwater and how runoff can be reduced.
2. **Public participation and involvement**. Regulated MS4s need to comply with applicable state and local requirements for open meetings and public information.
3. **Illicit discharge detection and elimination**. Communities must find and eliminate, as best they can, illegal discharges of stormwater into their MS4s – either from direct or indirect sources.

4. **Construction site runoff control**. This MCM requires communities to adopt effective sediment, erosion, and waste controls for applicable construction sites.
5. **Post-construction runoff control**. Regulated MS4 communities must develop and implement strategies, including long-term maintenance and operations of structural and non-structural BMPs, for controlling post-construction runoff.
6. **Pollution prevention and good housekeeping**. Regulated MS4s must develop plans to reduce stormwater runoff from municipal operations that include BMPs, municipal employee training, and measurable goals.

Chesapeake Bay Requirements: The Chesapeake Bay region has been rather uniquely impacted by aggressive water quality regulations and policies over the past decade. Those impacts are now being felt at the local level in regards to stormwater management requirements. In 2010, consistent with the CWA and in coordination with the states and the District of Columbia (DC) in the Chesapeake Bay Watershed, the EPA established a "nutrient and sediment pollution diet" for the Bay. The diet is known as the Chesapeake Bay Total Maximum Daily Load (TMDL), or Bay TMDL. Concurrent with the development of the Bay TMDL, the EPA required the Bay watershed states and DC to develop watershed implementation plans (WIPs) in order to gain "reasonable assurance" that the Bay jurisdictions will achieve nutrient and sediment reductions needed to implement the TMDL. The Bay watershed states are currently working with their respective local jurisdictions to establish and implement WIPs.

Responding effectively to the NPDES MS4 permit requirements, both Phase I and Phase II, and to the Bay WIPs, is inherently difficult and likely to be expensive because:

1. The physical, chemical, and biological qualities of stormwater are complex and costly to assess;
2. The quality and flow quantity of stormwater are costly to control; and,
3. Water quality improvements will depend on changes in the behavior of property owners and public employees.

Challenges for Local Government Officials

The impacts of urban stormwater runoff cannot be ignored. One acre of paved parking space creates sixteen times the runoff for a meadow of the same size (Oregon Environmental Council, 2007). Large volumes of runoff erode streambeds and banks; threaten the flooding of buildings; and imperil roads, bridges, culverts, and other infrastructure. Scientific findings indicate that in built areas, runoff often carries heavy metals, pesticides, fertilizers, bacteria, hydrocarbons, and sediment. Such pollutants destroy habitat, kill plants and animals, fill navigation channels, plug groundwater injection systems, and pollute groundwater itself. Adjusting to the new understanding about the environmental impacts of stormwater implies that stormwater management is becoming more complex. To the technical problems of engineering conveyance systems, stormwater managers are taking on adaptive problems, which require changes in the behavior of government and citizens toward their environment. This change in stormwater management is no less than a paradigm shift, the challenge of which is, for local government officials: How can we create and pay for efficient and effective behavior changes, processes, and organizations to manage stormwater?

Turn the coin over, however, and view stormwater as an asset. When well managed, stormwater replenishes the earth, both on the surface and underground. Water is necessary for plant and animal life. It is a key factor in the aesthetics and enjoyment of a place. It is fundamental to a local economy, including its industry, commerce, and tourism. The challenge to local officials from this perspective is: ***How can we turn a necessity, perhaps in the form of a permit required of our jurisdiction by the state, or the demands of environmentally interested citizens and groups, into a possibility, the opportunity of which is to enhance the asset value of stormwater in our locale?***

For most taxpayers, however, stormwater management is something of a mystery. Runoff appears to be a natural occurrence, and stormwater infrastructure to control for flooding is largely hidden underground. As local government official in Pennsylvania commented, "People care; they really do, but they need to become more educated about what runoff does and what stormwater management means." Taxpayers also need to consider what responsibility they bear for runoff problems.

Complicating your answer to these challenges is the fact that there is no such thing as a free lunch. Adding environmental services to stormwater management and investing in stormwater as an asset involves costs. Paying for more stormwater services decreases the opportunity for providing other public services or for leaving more money in the pockets of citizens and businesses.[1] Moreover, the common context of local governance in America is daunting at this time: engineers and economists report that the bill due for deferred maintenance of physical infrastructure across the nation is huge; and citizens are resisting taxes and expressing anti-government sentiments, even while they make additional demands on the public sector. Faced with such challenges, elected officials tend to focus their efforts on surviving in the short run, staying viable until the next election or until retirement, at which time long-run problems become the responsibility of someone new to the job. Overcoming the biased towards short-term decision-making will require committed and influential long-term leadership.

[1] According to economic theory, local government decision makers should invest in stormwater services to the point that the additional benefit provided is equal in value to the additional cost incurred. The decision is complicated, however, by the fact that benefits of improved stormwater services will extend beyond local jurisdictions' boundaries; these "external benefits" of stormwater management provide a rationale for the involvement of state and local governments in the decision. Hopefully, too, with benefits extending to others, costs will be shared by others. An additional complication arises because benefits and costs will extend over time, and decision makers must evaluate the provision of benefits for people living into the future while incurring costs in the present.