Chapter 5

Watershed Flow Regime Restoration Evaluation Process

Facilitating and Funding Stormwater Management for Ecosystem Improvement

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CH2MHILL

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Facilitating and Funding—Stormwater Management for Ecosystem Improvement

Introduction

In order to achieve flow restoration in urbanized watersheds, a significant number of stormwater best management practices (BMPs) will have to be implemented at considerable expense. Implementing stormwater BMP retrofits for impervious areas currently receiving no stormwater management is integral to retrofitting urbanized watersheds for flow restoration purposes.

Dispersed stormwater BMP techniques appear to have a good potential for achieving restoration if significant implementation occurs throughout the watershed. BMPs such as bioretention, porous pavement, rain gardens, and disconnecting impervious areas are all BMP techniques that appear to have potential for success. However, depending on the size of the watershed, significant implementation may require thousands or perhaps tens of thousands of projects to restore target flows. Fortunately, these small individual projects can be packaged together on a watershed or neighborhood level to make implementation more manageable. With an effort of this magnitude, the challenge involves finding many opportunities to treat impervious areas and the sources to finance projects.

In the face of increasing pressure to reduce rather than increase taxes, finding cost-effective solutions and creative ways to fund projects are critical success factors for advancing stormwater management goals. Some communities are already considering market-based trading approaches (i.e., similar to air emissions trading and trading in pollutant load reductions) to fund stormwater management (City of Portland, 2006). Traditional funding mechanisms such as through state and local taxes, grant programs, federal projects, and private funding will also continue to be important and are discussed in Appendix 5A.

This chapter describes several alternative methods to fund and implement stormwater BMP retrofits with the goal of watershed flow regime restoration. The alternative funding mechanisms vary from one time event funding sources, funding sources from incentives that could be offered to the redevelopment community, and market-based approaches. The facilitation discussion includes examples of successful institutional approaches for identifying BMP opportunities as well as practical considerations that, if in place, can improve the likelihood of BMP implementation.

This chapter is one of a series of related documents[1] developed under a study to address Great Lakes flow regime-based ecosystem improvement projects. These chapters are

[1] Executive Summary, Chapter 1: Watershed Flow Regime Restoration Evaluation Process, Chapter 2: Developing Stormwater BMP Quality Gallon Metric, Chapter 3: BMP Evaluation Process, Chapter 4: Quality Gallon Accounting System Protocol, Chapter 5: Facilitating and Funding Stormwater Management for Ecosystem Improvement, Chapter 6: Ecosystem Improvement Transaction Example Contracts, Chapter 7: Study Evaluation, Chapter 8: Study Communication Summary

presented individually because different applications are anticipated depending upon end users' goals. Chapters may be useful to users individually or collectively[2].

Background

Historically, stormwater management facilities in urban areas were designed to remove stormwater or snow melt from developed areas as quickly as possible. Minimization of downstream flooding, impairment to physical improvements and related human uses became a necessary component of stormwater management. Many older urbanized areas in the U.S. collected stormwater and sanitary waste in combined sewer systems. However, urban developments constructed after the mid-1960s have systems designed to handle stormwater runoff separately from sanitary waste. In addition, to reduce or eliminate overflows from combined sewers, many formerly combined sewer facilities in older urban areas have been separated in the last 30 years. Separate stormwater management facilities usually direct runoff to the nearest watercourse, unlike central sanitary systems that collect wastewater for treatment and discharge often at distant locations (Reese, 2006).

Urban stormwater management facilities constructed in the past have had two major objectives: (1) quick removal of standing water that interferes with land uses following wet weather events, and/or (2) reduction of the most egregious downstream flooding that threatened public safety and/or public and private improvements such as roadways, bridges, residential homes, and businesses (for example, once in 10-year flood or larger flood events). To prevent downstream flooding of property in watercourses receiving stormwater discharges from highly urbanized areas, natural watercourses have been modified through deepening, straightening, widening, bank armoring, or, in extreme cases, completely enclosing or paving.

Beginning in the late 1960s, many suburban communities began to implement local site construction requirements for new residential subdivisions and commercial developments mandating incorporation of onsite stormwater detention or infiltration facilities. Initially, onsite stormwater facilities were primarily designed to reduce the magnitude of major downstream flood events associated with the increased runoff from impermeable surface areas of new developments (for example, roofs, driveways, sidewalks, parking lots, and streets).

Until the early 1990s, little thought was given to the impacts of stormwater pollution or the effects of increased frequency, velocity, and volume of flows on both water quality and physical habitat essential to support fish and other beneficial aquatic organisms. Concerns over pollutant loadings from stormwater prompted federal lawsuits by national environmental organizations that forced the U.S. Environmental Protection Agency (USEPA) to phase-in regulation of discharges from stormwater facilities under the mandates of the 1987 amendments to the Clean Water Act. Rules that were promulgated by USEPA established a *phased* approach toward implementation of the program that went into effect in 1992. Phase I required National Pollutant Discharge Elimination System (NPDES) permits for a number of categories of stormwater discharges involving industrial activities, construction-related disturbances greater than 5 acres, and separate municipal storm sewer

[2] The project team members (CH2M HILL in association with The Conservation Fund, Cook and Franke, Public Sector Consultants, and Stormtech) acknowledge the generous support from the Great Lakes Protection Fund as part of their Growing Water suite of research projects.

operators serving a population of more than 100,000. Phase II, activated in 2003, expanded the permit requirements to include smaller publicly owned and operated stormwater facilities with populations greater than 10,000 as well as land disturbances over 1 acre in size.

These new federal requirements and complementary state regulations have prompted a new perspective regarding the impacts of stormwater on receiving waterways. Water quality concerns and water flow issues related to aquatic habitats are being evaluated in addition to traditional stormwater management issues that focused upon removal of water from surface areas and flood prevention. There is a growing body of evidence that runoff from highly urbanized areas increases the magnitude and frequency of flows on an annual or more frequent basis and subsequently causes significant adverse impacts on habitat for aquatic organisms (for example, bank erosion and sedimentation, bottom scouring, and elevated in-stream velocities) (USEPA, 2006a). There is also evidence that the increase in impermeable surfaces in developed areas are significantly altering groundwater flows thereby decreasing the base flow of nearby streams and increasing water temperatures during critical summer low flow periods.

Local governmental units have used a variety of methods in the past to fund stormwater management to remove water from developed properties following wet weather events and to prevent exacerbation of major downstream flooding (Lindsey and Doll, 2006). Obtaining support and public funding for projects designed to prevent private and public property damage associated with highly visible flood events is easier than securing funds for actions to prevent damage to aquatic habitat since the direct connection between the problem, excessive flows, and the impacts, declining number of beneficial aquatic organisms, is not as readily apparent and the value of the losses not as easily determined. While using some of these same funding approaches to implement stormwater BMPs to protect water quality and aquatic habitat may be available in some instances, in many cases, new funding mechanisms are needed.

This study examined the implementation of alternative funding and project facilitation mechanisms focusing on incentive and market-based approaches for environmental restoration. While project funding mechanisms provide financial support for implementing BMP projects in a watershed, project facilitation addresses the administrative and practical elements needed for implementation. Project facilitation and project funding are interrelated but can be distinctly different. For example, funding may be available to implement a BMP, but the project may not move forward due to barriers that, if removed through a facilitated process, could result in project implementation. A discussion of traditional funding sources such as locally generated revenue, grant programs, federal projects, and private sources is included in Appendix 5A.

Table 5-1 summarizes traditional and alternative stormwater funding mechanisms for BMP implementation. These examples have been historically implemented for primarily capital projects to minimize the impact of wet weather events on receiving watercourses in developed areas; however, these types of funding mechanisms could be used for flow regime restoration BMP projects.

TABLE 5-1
Summary of Stormwater Funding Options

Stormwater Management BMPs to Protect and Rehabilitate Flow Regimes		
Source of Funding	**Type of Funding**	**Examples**
Local Revenue	General Fund Budget	Capital improvements funded by local taxes, state revenue sharing funds, or other sources of unrestricted revenue; funding for on-going operation and maintenance
	Fees/Special Assessment Budget	Stormwater utility or special district assessments or other locally imposed assessments or fees to fund capital improvements or operation and maintenance
.	General Obligation Bonds	Use of general funds to retire capital improvement bonds
	Revenue Bonds	Use of restricted funds to retire capital improvement bonds (for example, drainage districts, special purpose project areas, or stormwater utility assessments)
State/Federal	State and Federal Grants	Clean Michigan Initiative (CMI); generally used for capital improvement projects
		Federal Community Block Grants; Clean Water Act Section 319 Grants; Wisconsin grants (Targeted Runoff Management, Urban Nonpoint Source and Stormwater) generally used for capital improvement projects
	Federal Projects	U.S. Army Corps of Engineers Water Resources Development Act (WRDA) Projects; generally used for capital improvement projects
	Subsidized Loans	Federal/State Clean Water Act Revolving Loan Funds; generally used for capital improvement projects
Private	Regulatory	Generally limited to staff funding with little or no capital improvement or operation and maintenance funding
	New Site Development	Requirements of local/state site plan approval process; generally used for capital improvement projects
	Enforcement Options	Supplemental Environmental Projects (SEPs); generally used for capital improvement projects
	Market Driven Alternatives	Volunteer trading for increased onsite development in exchange for greater offsite environmental improvements, regulatory flexibility in exchange for meeting a higher environmental standard (Wisconsin Department of Natural Resources (WDNR) Green Tier Program); can be for either capital improvement or operation and maintenance funding
	Nonregulatory	Private contributions from businesses, foundations, etc.; can be for either capital improvement or operation and maintenance funding

BMP Units for Prioritizing Funding or Trading

This study measures flow regime BMPs in terms of the number of gallons or Quality Gallons provided. BMP Gallons are equivalent to the BMP volume (expressed in gallons) for a design storm consistent with flow regime control (as discussed in Chapter 1). The BMP Quality Gallons are an adjustment to the BMP Gallons based upon additional environmental and societal benefits provided by the BMP, such as habitat, water temperature, location, and priority within the watershed, etc. The BMP Quality Gallon concept is discussed in detail in Chapter 2.

Depending upon the financial funding approach, the BMP Gallons and Quality Gallons could be used to measure, prioritize, and compare BMP benefits provided by a stormwater BMP. In this manner, the most cost-effective projects to produce Gallons or Quality Gallons could be determined to optimize watershed restoration investments.

In the case of a market-based stormwater trading system, Gallons and/or Quality Gallons could be used as a tradable commodity. If watershed goals are established in terms of Gallons and Quality Gallons, then the contribution made by individual BMPs towards the overall watershed restoration goal could be measured and tracked. Receiving credit towards restoring the flow regime can be achieved if the stormwater BMP provides Gallon or Quality Gallon benefits in amounts greater than that required by existing regulations. For example, providing additional stormwater BMP benefits in a new development or redevelopment project in excess of that required to meet current regulations could qualify for credit towards watershed flow regime restoration. BMPs that meet current regulations do not receive credit, but BMPs that provide Gallons and Quality Gallons beyond the regulated amount would receive credit towards restoration goals.

In order to determine the watershed restoration goals in units of Gallons or Quality Gallons, the watershed must be "baselined" to determine existing and "restored" flow regime conditions. The difference between the two conditions would determine the incremental BMP requirements, and similarly, the amount of credits available for providing BMPs for flow regime restoration in an impaired watershed. Details for quantifying the amount of flow regime restoration necessary to achieve target flows in a watershed are discussed in Chapter 1.

Alternative Project Funding

There are various potential sources of funds to build, implement, and maintain BMPs that would protect and restore natural flow regimes. On a watershed basis, a combination of funding sources may be needed. Where protection is the primary objective, regulatory programs may offer the best approach since new developments can be required to meet stormwater discharge requirements at the time of design and construction to minimize the negative effects on flow regimes. Where BMPs require long-term maintenance, sustainable and secure funding sources are needed. Where the objective is to restore impaired flow regimes, new or innovative uses of traditional funding approaches may be needed.

Funding, whether for retrofitting existing BMPs or installing new BMPs, could be obtained through a number of mechanisms, including new regulations, regional funding initiatives,

one time event funding sources, developing incentives for property owners, and through market-based mechanisms. The value of these multiple funding mechanisms may in some cases be in implementing watershed wide programs while in other cases it may be a mechanism that paves the way for wider scale implementation. For example, by generating funds that can be used as a match with other potential funding sources, local authorities can better leverage their funds and implement more restoration projects. One approach would be to use the initial funds as seed money to perform advance restoration. Upon finding sponsors to pay for the completed projects, this would generate a source of funds to restore additional areas. Furthermore, these alternative approaches could be targeted at select areas to raise awareness of the importance of flow regime restoration in a community, which can lead to support for more traditional forms of funding.

When discussing these potential funding options, the difference between incentives associated with development and market-based mechanisms can easily become blurred. Consequently, a spectrum of incentives and market-based approaches is provided. The following funding approaches are described along with examples of implementing flow regime restoration:

- One Time Event Funding Sources
- Development and Regulatory Incentives
- Market-Based Mechanisms

A discussion of each element is presented below and includes a description, potential limitations, and examples.

One Time Event Funding Sources

An opportunistic funding source is one where by virtue of having predetermined restoration projects, a community is in a position to accept funds that may become available for this purpose. One example of such a funding source is a Supplemental Environmental Project (SEP). SEPs are an option used by state and federal agencies to assist in the resolution of alleged environmental permit violations. A SEP is an environmentally beneficial project that is not otherwise required and that a permit holder agrees to undertake in a voluntary settlement of a violation.

The USEPA encourages the use of SEPs in settlement agreements and has issued interim policy guidance (USEPA, 2006d). States have varying policies towards promoting the use of SEPs. Some states have avoided the practice of accepting environmental projects in lieu of civil penalties due to a concern that SEPs may be perceived as a method to pay for desired state projects. They can also be administratively burdensome and require support from the EPA Administrator and/or the State Environmental Agency Director before staff members are willing to move in this direction. Other states have embraced SEPs as a means to resolve alleged environmental permit violations by encouraging investments in resource improvements rather than simply the collection of civil penalties for deposit into the state's general fund. By undertaking a SEP in the same watershed as the alleged violation, it is hoped to achieve the desired result of improving the resources/ecosystem in the vicinity of the potential environmental damage alleged in the violation.

As an example, the Michigan Department of Environmental Quality (MDEQ) policy for SEPs (MDEQ, 2005) is relatively broad in its application and encompasses a wide range of supplemental projects that result in resource improvements, potentially including those that could be achieved through flow enhancement BMPs. While SEP policies and use vary from state to state, the MDEQ SEP policy states that the proposed project and settlement agreement must meet a number of basic requirements as identified in Table 5-2.

TABLE 5-2
Summary of MDEQ Supplemental Environmental Policy (SEP) Requirements

The proposed SEP must meet the following requirements:

- Not be inconsistent with any provision of the underlying statute
- Advance at least one of the objectives of the state's environmental statutes
- Reduce the likelihood of similar future violations, reduce the impact or risk to human health or the environment due to the violation
- Be environmentally beneficial (for example, improve, protect, or reduce risks to public health and/or the environment)
- Not be an activity or project that the alleged violator, or any other entity, is otherwise legally required to perform under state law
- Fall within an acceptable category (for example, pollution prevention/reduction, environmental restoration/protection, public health, environmental assessments, environmental awareness, or emergency planning/ preparedness, etc.)
- Adequately define the type and scope of the proposed project, the mechanism for managing and controlling the committed funding (outside of the control of the MDEQ), the project schedule, and completion verification mechanism.

The current MDEQ SEP policy can provide the driver to fund BMPs designed to enhance flow regimes. If a similar policy were implemented in other states, the SEPs could have many applications. The SEP policy is especially well suited for southeast Michigan in the Rouge River watershed because this area has one of the largest industrial complexes in the U.S. Industry may provide the greatest opportunities to incorporate SEPs because the SEPs may have real appeal to private companies, the adjacent communities, and the state as an alternative to monetary penalties in the resolution of alleged environmental permit violations.

Limitations

While technically within the scope of approval process based upon current federal and at least MDEQ's SEP policy, no specific example of the use of a SEP to fund flow regime enhancement have been implemented to date. However, a specific theoretical example is examined below. At the very least, specific flow regime enhancement BMP opportunities would need to be identified in advance of negotiations on a particular SEP proposal, and have some relationship to the violation (for example, same geographic area, and/or enhancement of resources impaired by the violation, etc.).

Hypothetical Example No. 1

A national firm located in the lower Rouge River industrial complex has been cited by the MDEQ for violations of its NPDES permit that subjects the company to potential civil fines and penalties of up to $10,000/day for each violation. The company and the state are interested in resolving the matter through a negotiated settlement and are generally aware that SEPs have been an element of previous settlements with other firms similarly cited for permit violations.

The company asked MDEQ if they are aware of any SEP that might be appropriate for the company to consider proposing as part of its resolution to the alleged violations. From its catalog of potential SEPs, the MDEQ identifies projects submitted by Rouge River watershed local government agencies that identify BMPs for flow regime enhancement. The company contacts the appropriate sponsoring local agency, and enters into an agreement that identifies the location, scope, schedule, funding sources, and other issues.

As part of its proposed resolution of the alleged violations, the company submits the agreement with the support of a sponsoring local agency as a SEP. The MDEQ accepts the proposed SEP and other settlement terms. The permit violations are resolved and the flow regime enhancement BMP is constructed under the terms of an agreement between the local agency project sponsor and the company that is subsequently incorporated into a negotiated, enforceable administrative settlement between the company and the MDEQ.

The Gallons and/or Quality Gallons concept could be used as part of the SEP process to evaluate which projects would provide the most environmental value to the watershed. Alternatively, if a specific portion of a watershed were affected and Gallon and Quality Gallon targets for that portion of the watershed had been developed, then the SEP could target specific Gallon and Quality Gallon restoration goals within that portion of the watershed as part of the negotiated settlement.

Discussion

As part of this project, MDEQ staff members who were involved in negotiating SEP settlement agreements were asked to comment on the suitability of stormwater flow enhancement BMPs as an element of a SEP settlement. The MDEQ staff indicated that under the right circumstances, stormwater BMPs would fit under the state's SEP policy. During the course of the study, it was brought to the attention of the principle investigators for this research study that a company was soliciting projects to incorporate into a SEP proposal to the MDEQ.

Unfortunately, by the time specific stormwater BMP projects could be identified and forwarded to the company, other supplemental environmental projects had been included in the proposed SEP and accepted by the MDEQ. Although not successful in terms of funding a specific stormwater BMP, the contacts with both the MDEQ and the company indicated that the use of SEPs to provide funding to implement flow enhancement projects beneficial to the Rouge River ecosystem were both feasible and practical. The experience also emphasized the need to identify potential stormwater BMP projects in advance of any SEP negotiation and to make both the regulators and the regulated community aware of these projects.

Essential Elements of a SEP

The following identify the essential elements needed to utilize a SEP as an option to fund flow regime enhancement BMPs:

- Environmental regulatory agency with authority and policy that allows consideration of SEPs as a means to resolve a portion of the civil penalties that might otherwise apply to permit violations
- A watershed plan that identifies BMPs and locations as well as expected proportional benefits of each BMP in achieving target flow regimes
- Consistency between locally generated flow regime targets and related BMPs with the types of projects identified by environmental regulators as acceptable for consideration in a SEP
- Regulator awareness of flow regime enhancement projects and willingness to maintain a "library" or list of potentially acceptable projects for consideration in a SEP
- Regulated entities with an awareness of the availability of SEPs as an element to resolve alleged violations
- Estimated costs, preliminary design, and flow regime benefits available for specific BMP projects
- Agreement between the local project sponsor and the company that includes, in addition to a cost-sharing arrangement and management of funds, supplemental contingency agreements or instruments to minimize uncertainties, a schedule for project completion, and a method to certify completion to the regulatory agency

Development and Regulatory Incentives

Incentive funding sources occur when regulations, ordinances, or other requirements allow the opportunity for individuals to choose to implement stormwater management BMPs above what otherwise would be required in exchange for the individual receiving something of value in return. The individuals receiving something of value oftentimes make decisions based upon the financial, administrative, community relations, or time-savings benefits offered within the incentive.

These study conclusions were drawn from direct discussions with developer and industrial participants in the study. The study showed that these advisors are willing to go beyond environmental regulations, but only with a clear incentive to do so. Incentives discussed include: regulatory flexibility, quicker building permit approvals, and positive public relations. However, there was often skepticism that incentives could be offered that could cut through bureaucracy and provide an obvious reason for conducting restoration. There was also a preference to conduct work on their property instead of working offsite.

The outreach to a group of developer stakeholders took place in the form of a survey. The results of the survey are included in Appendix 5B. Their input into the process led to further expansion of the following development and regulatory incentive concepts to spur restoration.

Regulation Incentives with New Developments

Many local units of government and some states use regulatory programs to require stormwater management as a condition for approval of site development plans. For new developments, public agencies covered under stormwater NPDES discharge requirements must incorporate six minimum control measures (USEPA, 2006b). One of the six minimum measures requires the development of a post construction stormwater management program to regulate runoff at new development sites to control higher peak flows and lower base flows, stream bank erosion, increased stream temperature and pollutant load, reduced stream bank vegetation, and degraded fish and aquatic habitat (USEPA, 2006c). Under this federal and/or state regulatory mandate, many local governments can use a site plan approval processes to require that onsite stormwater management incorporates BMPs as part of the developer's costs for minimizing impacts to surface water flow regimes and water quality. Some units of government have extended stormwater management coverage further to minimize impacts to groundwater.

As an example, Wayne County, Michigan, under its state-issued MS4 NPDES general stormwater discharge permit, has adopted a relatively stringent Stormwater Management Ordinance and related Stormwater Management Administrative Rules (Wayne County, 2005) to regulate the quality and quantity of stormwater runoff from sites undergoing development or redevelopment within the county's jurisdiction.

The Wayne County administrative rules provide for the use of alternative performance and design standards under certain conditions:

Rule 302 Alternative Performance and Design Standards

(A) Notwithstanding any other provision in these rules, the county may approve a stormwater management system that does not satisfy the performance or design standards set forth in Chapters 5 and 6 of these rules if the following conditions are met:

> *(1) A request for approval of a stormwater management system that incorporates alternative performance or design standards is submitted to the county in conjunction with an application for stormwater construction approval;*
>
> *(2) The applicant demonstrates to the satisfaction of the county that the alternative performance or design standards are adequate to control and prevent flooding, erosion, pollution, and other effects of storm water runoff, consistent with the Ordinance; and*
>
> *(3) The alternative performance or design standards are sufficiently described and documented to enable the county to assess their effectiveness.*

Under the alternative performance and design standards, an offsite stormwater management facility could be used by a developer to meet Wayne County's stormwater permitting requirements if it provided equivalent or better controls of potential issues such as flooding, erosion, habitat degradation, and pollution in the areas downstream of the proposed project's stormwater discharge.

Limitations

Local regulations like those adopted by Wayne County in response to new federal or state stormwater discharge requirements can effectively limit the impacts new developments have upon the flow regime. However, except in cases where such regulations can be applied

to redevelopment activities, new stormwater controls generally do not address existing impairments to ground and surface water flow regimes in previously developed areas. The following hypothetical example describes the potential application of the alternative regulatory approach for implementing more effective stormwater BMPs offsite rather than for requiring stormwater detention within a redevelopment project.

Hypothetical Example No. 2

A large, national retail store has proposed redevelopment of a vacant, former industrial site. The size of the new retail store and parking requirements to make the redevelopment economically viable require full use of the site for the retail structure and associated parking. While the site design can accommodate BMPs to control pollutants (for example, oil, grease, litter, sand and silt, etc.), the site is not large enough to meet the onsite detention requirements of the Wayne County stormwater ordinance designed to reduce existing downstream flooding, bank erosion, and habitat damage related to excessive runoff.

Upstream on the same watercourse, a local unit of government has identified a site and completed a preliminary design for a stormwater management facility as part of an overall watershed plan to address flow regime problems, but is lacking funding to implement the project. The developer and the local unit of government reach agreement on the cost participation of the developer in the construction of certain planned BMP stormwater controls upstream of the proposed redevelopment.

The county concurs that the BMP(s) to be implemented under the cost sharing agreement will result in more desirable flow conditions downstream of the proposed redevelopment than that which would have resulted from the otherwise required onsite retention. A three-way legally enforceable agreement is entered into between the local unit of government, the county, and the developer. The outcomes of the agreement include: successful redevelopment and implementation of the locally identified BMPs; compliance with the Wayne County stormwater discharge requirements; and, incremental progress is made toward restoring the target flow regimes in the waterway. Finally, the developer's net return on investment in terms of the increased value of the property is greater than the cost of the contribution in the offsite BMP.

Discussion

This example meets the following minimum requirements for the successful application of an incentive-based regulatory approach. It has (1) a specific, identifiable regulatory outcome (such as attenuation of stormwater flows affecting downstream areas), (2) a flexible regulatory framework to allow for alternative means in achieving desired environmental outcomes, (3) economic benefit to the redeveloper (that is, the increased value of property equals or exceeds the participation cost to implement the BMP), and finally, there are no unintended consequences or shifting of environmental impacts (i.e., enhanced flow conditions downstream of the redevelopment projects are achieved). One essential requirement that is *not* adequately addressed by the example is the basis upon which the regulated redeveloper would be able to quickly assess whether the cost of participation in the implementation of the offsite stormwater BMP would make the investment in the site economically viable.

To simplify the example, the offsite stormwater BMP(s) are proposed at a location upstream of the redevelopment site that in the most direct manner ensures that the improvements provided under the alternative offsite application of the regulations would accrue to the same portion of the stream as if all the stormwater controls were applied onsite. There may be circumstances, however, where acceptable alternative offsite BMPs could be located downstream of the redevelopment site or in another branch within the same watershed, but not necessarily upstream of the redeveloped site. Local stormwater regulations would likely be designed to meet multiple objectives such as flood control for large infrequent storms (for example, once in 5-, 10-, or 100-year storm events), a target stream flow regime frequency curve for smaller precipitation events, and water quality objectives (for example, reduced transport of suspended solids, oils and grease, litter, etc.). The negative impacts of larger flood events and/or flow regime disruptions (or the projected associated improvements from the application of stormwater BMPs) may not be immediately downstream of the redevelopment site. In such instances, the offsite alternatives for flood control or flow regime enhancements might be located in downstream areas or in other portions of the watershed where the achievement of the desired environmental outcome can be accomplished more cost effectively.

In the example, the developer's cost share of the BMP was negotiated. If a common measure of value or metric could be applied to the onsite stormwater control as well as the offsite optional BMP, a basis for trading increased onsite development for offsite stormwater BMP implementation could determine the appropriate amount of offsite BMPs needed. The *Quality Gallons* concept discussed in Chapters 2 and 4 of this report could provide the common metric needed to reduce the arbitrary nature of any agreement to allow a developer to transfer stormwater control requirements to an offsite location. Having an established transfer approach, which could include requiring a greater than 1:1 trading ratio, would allow a developer to quickly assess the economic viability of the alternative offsite approach to meet stormwater management permit requirements. Maintenance costs and other contingencies would still need to be negotiated; however, the level of uncertainty related to the economic viability would be substantially reduced.

Requirements to Implement Stormwater Regulatory Incentives

To be successful with implementing stormwater regulatory incentives, several requirements must be met.

- Local stormwater ordinance with the flexibility to allow offsite alternatives for achieving desired improvements in flow regimes and protection of resources.
- Local stormwater ordinances must be stringent enough to create a potential for viable incentives. Without requirements, there is no incentive to find a more economical approach to implementation.
- A watershed plan that identifies BMPs and locations as well as expected proportional benefits of each BMP in achieving target flow regimes.
- Consistency in design standards and goals between the local stormwater ordinance requirements and the target flow regimes and watershed plan conclusions.

- Developer and regulator awareness of the flexibility of the onsite stormwater discharge requirements, and the identification of alternative stormwater BMPs contained in the watershed plan.
- Preliminary design/estimated costs and required property control for offsite BMPs.
- Site redevelopment cost comparisons that allow or favor offsite compared to onsite control of stormwater discharges.
- Agreements that include, in addition to a cost sharing arrangement, contingency agreements, instruments to minimize uncertainties, and responsibility for long-term maintenance of offsite BMPs (see examples in Chapter 6).
- A common metric to allow comparison of the onsite versus offsite stormwater management BMPs that will provide the basis for establishing a developer's contribution toward implementation of offsite alternative BMP(s).

Rewarding Superior Environmental Performance

Environmental regulatory agencies in consultation with the regulated community have sought to develop approaches to supplement and complement existing command and control regulatory schemes that would create rewards and/or incentives to encourage superior environmental performance of regulated entities. It is basically the addition of a "carrot" or reward system to the "stick" or penalty provisions usually employed in a command and control regulatory framework. While often described as a "flexible regulatory approach," it basically creates incentives for the regulated community to go beyond the minimum environmental performance requirements.

The Wisconsin Department of Natural Resources (WDNR) Green Tier Program is an example of such a flexible regulatory approach. The Green Tier Program has already been applied to development projects in the area of stormwater management. Under the WDNR Green Tier Program, permittees must have the following:

- A good environmental record
- Willingness to go beyond regulatory requirements
- An Environmental Management System (EMS) (or be willing to adopt one)
- Ideas for adjusting regulations that benefit both their business and the environment
- Commitment to two of the following three areas: 1) superior environmental performance, 2) operations with goals and standards in environmental areas that the WDNR does not regulate, and 3) protection and preservation of the environment.

In exchange for these commitments, the WDNR provides the following benefits:

- Recognition of superior environmental performance
- A single point of contact with the WDNR
- Allowed use of the Green Tier logo

- Potential for permit streamlining, modified monitoring requirements, etc. through Tier 2 participation

Other states within the Great Lakes that are known to have or that are considering similar incentives within regulatory programs include Indiana, Michigan, and Pennsylvania.

The following example is provided on how a Green Tier type of program could be applied to flow regime restoration.

Hypothetical Example No. 3

A large "wet" industry within the Menomonee River watershed desires to be an industry leader in the environment. The industry has several permits with the WDNR (wastewater effluent, air discharge, etc.) and has agreed to commit to the Green Tier Program. The company believes that they benefit from Green Tier's entry level program incentives and intends to develop customized regulatory incentives that will provide them with a competitive business advantage once they have sufficiently demonstrated compliance with the program.

The company is a significant water user and chooses to demonstrate superior environmental performance through reinvesting in highly visible projects that improve the health of their watershed (for example, improved habitat, water quality, or flow). The company meets this requirement by providing a monetary contribution each year for watershed projects.

Half of the funding is used to control water quality and flow from impervious areas on the industry-owned property. A bioretention BMP is constructed in a parking lot the first year. The other half of the funding goes into a watershed restoration trust fund. In the future when all the company property has had BMPs installed, all of the funding will go into the watershed trust fund. The trust fund is set up to allow other industries within the watershed to also contribute to the fund in the future. Each year, the company partners with a local watershed organization that sponsors a competition for watershed restoration projects which require at least a dollar-for-dollar cost match. Gallons and/or Quality Gallons could be used as part of the basis for determining which projects are most cost effective and strategic to support. Alternatively, specific Gallon and Quality Gallon goals by subwatersheds could be targeted for restoration and support through the watershed trust fund program.

Requirements to Implement Regulatory Flexibility Stormwater Management Option

To be successful with implementing the regulatory flexibility stormwater management option, several requirements must be met.

- State law must provide a legal framework for regulatory flexibility in exchange for superior environmental performance.
- Regulated entities must receive sufficient benefits in the form of cost savings, public image, and clear regulatory requirements which make the decision to enroll in an incentive based program a good business decision.
- Clear, legally binding agreements must be available to define responsibilities of both regulators and regulated entities.

- Watershed BMPs which restore flow and habitat, and improve water quality need to be recognized as practices consistent with superior environmental performance.
- Specific restoration opportunities within the watershed must be readily available, preferably those which already have conceptual information available (cost, flow benefit, willing owners, etc.).
- Local watershed organization(s) must exist that are knowledgeable of project opportunities and willing to lead restoration efforts.
- Willing landowners must be available who would welcome restoration projects on their property. Landowners could be a mix of public and private entities.
- Maintenance responsibility for the constructed BMPs would have to be established.

Performance Zoning to Meet Citywide Stormwater Regulations

Performance zoning and Transferable Development Rights are both incentive-based approaches that rely upon flexibility in stormwater regulations to adjust zoning densities in exchange for providing something of value to a developer or redeveloper and to the community. Performance Zoning focuses on how a parcel impacts adjacent lands and public facilities, not on the use of the land. This gives municipalities and developers more flexibility in designing projects, because the use of a property is not restricted as long as the impacts to the surrounding land are not negative (Tompkins County). An adaptation of this approach could be to grant development rights (that is, higher density) in exchange for providing additional environmental flow restoration on- or offsite. Instead of being a conservation mechanism, the Performance Zoning approach would be a flow regime restoration mechanism.

For example, Wisconsin law requires that existing urbanized areas demonstrate water quality improvements (total suspended solids [TSS] reduction) of 20 percent by 2008 and 40 percent by 2013. For older urbanized areas that developed without stormwater quality ponds, TSS reduction is currently only provided through street sweeping and is unlikely to meet the pollution reduction goal without additional BMP implementation. These requirements are codified in Wisconsin Administrative Code NR 151 and NR 216. Other states and counties have water quality or quantity requirements that vary in purpose and goals. Flexible, incentive-based approaches could play a role in meeting these requirements. Watershed issues such as total maximum daily load (TMDL) implementation, source water protection, and conservation objectives could provide regulators with additional reasons to offer developers incentives to undertake stormwater management measures.

Combining the Performance Zoning approach with an older community's need to meet TSS reduction requirements creates an opportunity for redevelopment incentives. Such an approach can benefit redevelopers, the local community, and taxpayers. Redevelopers benefit from obtaining additional units within the same property, the local community benefits by allowing market forces to pay for needed stormwater BMPs, and taxpayers benefit because they do not have to pay for the stormwater BMPs.

BMPs that are effective at restoring the flow regime also can be very effective in controlling water quality parameters such as TSS. Consequently, a program that implements BMPs to

control TSS can also provide flow regime restoration benefit. An example of how this system could work is presented below.

Hypothetical Example No. 4

An older community within the Menomonee River watershed is facing WDNR water quality mandates that will require significant capital expenditures to achieve compliance. The community has a vacant building site that redevelopers are considering for a condominium development. Ordinary redevelopment site zoning requirements would result in 60 units and meeting stormwater management requirements onsite.

The community offers the condominium developer the opportunity to increase density by one-third to 80 units under the condition that the developer financially supports the stormwater retrofit needs of areas elsewhere in the community. The financial support is provided to the community, which then constructs the BMPs. The financial payment covers the construction cost and maintenance cost for a period of 5 years. The community could use watershed restoration target goals to determine Gallon and/or Quality Gallon projects within the community. To strategically use the funding, the community could determine the most cost-effective projects in terms of the number of Gallons and Quality Gallons they provide.

The transaction results in meeting stormwater quality requirements for the condominium development and for additional areas within the community. If grant funds are available, the condominium developer payment could be used as watershed grant application matching dollars in order to provide additional water quality and stormwater BMP funds.

Requirements for Zoning Flexibility to Meet Citywide Stormwater Regulations

To be successful with implementing zoning flexibility to meet citywide stormwater regulations, several requirements must be met.

- Local stormwater and zoning ordinances would have to allow for flexible adjustments to meet local needs.
- Guidelines for how much area an offsite BMP would treat and associated costs would have to be developed. Developers would want to know offsite BMP costs up-front in order to evaluate their business plan.
- Adjusting local zoning requirements would have to be acceptable to local residents and also provide additional incentive to developers.
- Specific restoration opportunities within the community must be readily available, preferably those that already have conceptual information available (cost, flow benefit, willing owners, etc.).
- Willing landowners must be available who would welcome water quality and flow regime restoration projects on their property. Landowners could be a mix of public and private entities.
- Maintenance responsibility for the constructed BMPs would have to be established.

- The local infrastructure must otherwise be capable of supporting the higher density development

Transfer of Development Rights

The transfer of development rights (TDR) is one form of an incentive and arguably a market-based regulatory option that has been used effectively to achieve public land use goals involving preservation and management of open space. TDR is an incentive -based, regulatory approach that encourages the voluntary transfer of growth (development rights) from places where a community would like to see less development ("sending areas") to places where a community would like to see more development ("receiving areas"). A developer acquires the development rights on a parcel of land that the local community has identified for preservation and exchanges those rights in return for the right to increased density of development where the local community has determined that higher densities can be accommodated. TDRs have been applied in various forms in over 100 sites throughout the country (Pruetz, 2006).

The successful application of TDR depends upon a number of factors including the ability to identify "sending areas" (for example, farmland, environmentally sensitive areas, historic sites, etc.) with willing sellers of development rights and "receiving areas" where there is market demand and infrastructure to support increased density. TDRs are basically a private transaction between a willing seller and willing buyer in response to a government regulatory framework (for example, identification of sending areas, receiving areas, increased density allowed for each development right acre acquired, etc.). The attractiveness of TDRs is the fact that the preservation of certain lands determined to be of local, regional, or state value in their current undeveloped conditions can be accomplished with minimal expenditure of public dollars through private transactions.

TDRs are more applicable to conserving and protecting particular land uses (farmland, open space, etc.) than to restoring flow regimes as outlined and measured through flow duration curves in this study. However, opportunities for other important aspects of stream restoration such as stream habitat and water quality improvements may be more readily available on TDR properties than in an urban stormwater retrofit setting envisioned in this study. If the goal is to protect existing stream conditions (water quality and flow regimes) from the negative impacts of urban development, the use of TDR in combination with storm regulations are likely to be more effective than either applied separately. Moreover, by designating stream riparian areas and uplands located at the headwaters of streams as TDR sending areas, these lands become prime candidates for implementing watershed restoration projects.

Hypothetical Example No. 5

A developer in the Menomonee River watershed owns two 40-acre parcels of rural land. The local jurisdiction is promoting open space preservation, has a 5-acre minimum lot size restriction, and has allowed the transfer of development rights within the community to preserve open space in targeted areas. The purchase of transferable development rights reduces the minimum lot size to 2.5 acres.

The developer conducts a cost benefit analysis and determines that conducting a TDR between the parcels will be beneficial and cost effective. The development rights of the

parcel which happens to be located in an area targeted for open space preservation are transferred to the other parcel. The developer can consequently have one structure per each 2.5 acre lot instead of per 5 acre lot, thus doubling the number of structures on the land parcel. In addition, the local jurisdiction preserves open space.

Gallons and Quality Gallons could be obtained for the preserved land in this transaction as discussed in Chapter 2. The preservation does not in and of itself restore the flow regime, but does preserve the current flow condition that development would alter, even under the most stringent stormwater BMP requirements.

Market-Based Mechanisms

Market-based approaches attempt to incorporate economic forces of free markets to achieve desired social outcomes at lower overall costs. A key feature of a traditional market is the exchange of goods and services, as represented by transfers of commodities and money between parties. As such, by definition, these markets will have at least one buyer and at least one seller. Such approaches have been widely applied in both the U.S. and throughout the world in the regulation of financial institutions, energy production, telecommunications, waste discharges, and for other government-regulated activities.

Following the publication of USEPA's 2003 policy on Water Quality Trading, there have been over fifty USEPA and state grant applications involving trading, which demonstrates strong interest in watershed-based innovative regulatory approaches. As water quality credit trading approaches to watershed management continue to receive support from USEPA, selected state's regulators, permitted dischargers, and stakeholders, interest has proliferated, leading to a number of documented successes. Thus, watershed stakeholders are now studying the application of lessons learned from water quality trading to stormwater management programs.

Within the context of urban stormwater management programs, potential buyer and seller participants include communities with MS4 permits or general stormwater permits, other facilities and land owners subject to individual or general permits issued by local governments or stormwater utilities, and developers and landowners subject to local stormwater ordinances, fees, or other requirements.

To develop and implement credit trading programs involving urban stormwater sources, several challenges must be overcome. These include the following:

- The high cost of producing stormwater credits because urban stormwater retrofit credits are often more expensive than other options on a per unit basis
- The baseline responsibilities for creating and applying credits are not readily calculable where mass loading limits are absent
- Requirements for controls at maximum extent practicable levels leave no room for trading
- Managing for several parameters—average volumes, peak flows, and pollutant load reduction—can present challenging optimization problems and may require tradeoffs

More communities are beginning to confront these challenges, armed with information and examples from water quality credit trading and other market-based programs, including wetlands mitigation banking, habitat conservation banking, and even carbon credit trading. Some are seeking to integrate a more market-based approach with an existing program that may already include certain incentive-based elements. Others are working to craft programs with market- and incentive-based elements where none currently exist.

There is a wide variety of incentive-based approaches to stormwater management that have been used successfully in many communities for many years. Often, the existing incentive-based programs can be modified to migrate to an approach that would rely in part or whole on market-based elements. This can be desirable for communities wishing to accomplish one or more of the following objectives:

- Rationalize a fee structure to reflect true costs of service and treatment and create a nexus between the fee and the benefit/service in the eyes of the ratepayers and political decision makers
- Create clearer and stronger incentives and rewards for desirable actions
- Speed up the pace and/or increase the level of additional controls and beneficial actions
- Use market forces (e.g., pricing, trading ratios, and supply and demand management) to target specific priority locations or types of actions
- Present resources to the program that otherwise might not have had a reason or a way to contribute

A few of the most critical elements to a viable market-based approach for stormwater management are discussed immediately below. This is followed by a description of several model approaches, where selected elements are discussed by way of example.

Trading Baselines: Clear and Quantifiable

In the regulatory context of programs governed by the Clean Water Act, whether someone could be a buyer, seller, both, or neither is determined by their "trading baseline," as defined in USEPA's 2003 Final Policy on Water Quality Trading. A "trading baseline" is the performance level necessary for regulatory compliance (e.g., with stormwater ordinances), as defined, for example, by a maximum flow volume, a pollutant loading cap, or a level of environmental benefit or improvement that must be delivered (e.g., as measured by Gallons and Quality Gallons necessary for restoring flows consistent with fish presence in streams).

Buyers are then most typically regulated parties that have not met their baseline and must purchase credits to offset exceedences. If allowed, buyers could also be parties without any regulatory responsibility, such as non-profit organizations that want to support environmental programs by taking credits off the market and retiring them (so they cannot be applied to regulatory compliance).

Sellers can come from the regulated or unregulated sector: those that perform better than their baseline responsibilities and generate credits, and those that have no baseline and perform a creditable action.

In the stormwater management arena, the following could be potential buyers, sellers, or both, depending on how their trading baselines are specified by state or local requirements:

- A city, county, or other governmental unit that holds an MS4 or general stormwater permit
- An industrial facility, commercial site, or other landowner that holds an individual or general stormwater permit
- A public works program involving land disturbances that temporarily or permanently alters runoff profiles for infrastructure networks, such as highways, roads, and bridges
- A landowner developing or re-developing property subject to local stormwater control ordinances, including construction-related and permanent BMPs
- A landowner subject to a fee-for-service levied by a public entity with stormwater management responsibilities, such as a stormwater utility or local public works department

A quantifiable trading baseline is arguably the first critical element of creating a market—without it there is no way to determine who the buyers and sellers are, or what they are trading. The following three elements relate to credit generation and use, compliance-enforcement, and reporting.

Meaningful Credit Units

For the buyer with a regulatory responsibility, the units of exchange must be defined in, or readily translatable to, regulatory performance metric(s). If they are not, then they are meaningless and there will be no demand. For this reason, successful trading programs typically develop credit units identical to or consistent with the unit(s) in which trading baselines are expressed.

Examples of potentially meaningful credit units in the stormwater management context include the following:

- Gallons
- Quality gallons
- Water quality volume
- Pollutant load
- Impervious area (not percent, but for example, in square feet or acres)

Buyers and Sellers Finding Each Other

Different types of market structures and support mechanisms make it easier or harder for buyers and sellers to find each other. The harder it is for partners to connect, the more likely it is that the cost, inconvenience, and frustration of searching will result in fewer or no transactions. Some examples presented later in this section show how, with little or no enhancements, existing stormwater management program components can readily facilitate matching buyers and sellers. By definition, some of the models presented establish clear and familiar pathways for locating partners.

Exchanges of Stormwater-Related Benefit Units

Typically, at least three things must happen to enact a trade:

- The credits generated must be authenticated, verified, and documented (see Chapter 4 for additional details using the example of Gallons and Quality Gallons)
- The cognizant regulatory or oversight authority must recognize the credits as valid and applicable to the buyer's baseline for compliance purposes (assuming the buyer is regulated)
- The credits must change ownership from the seller to the buyer through a paper-based, electronic, or other type of process that records the trade

Exactly how these can be accomplished and who should be involved in a stormwater management context will depend on the pre-existing stormwater management program structure, including roles and responsibilities, information systems, recording and documentation processes, and oversight mechanisms (see Chapter 4 for additional details). The most appropriate exchange mechanism will depend on the size and scope of the market, with respect to the number of potential buyers and sellers, and the number and frequency of transactions. The "horsepower" of the methods chosen should match the programmatic needs, participants' preferences, and available resources.

Models for Consideration

The following market-based approaches to stormwater management are defined for discussion purposes:

- Commodity-Enhanced Existing Program
- Single Buyer
- Single Seller
- Multi-Buyer/Multi-Seller

The models will exist, or co-exist within a service area, governmental jurisdiction or for a defined watershed. The program rules establish the boundaries within which credit exchanges (or other transactions) are allowed.

Commodity-Enhanced Existing Program

In this model, the program manager would re-define the compliance and/or fee unit in terms of an exchangeable commodity, such as those identified above. At a minimum, the change could serve to present a fee structure that is more understandable by the ratepayers and provide the manager with a more precise way of developing full-cost rates, assessing fees, and projecting future revenues. Or, it also could be a purposeful interim step toward a more market-based approach, whether or not the new program resembled one of the other models identified below.

- A Great Lakes city chooses to implement a BMP Gallon accounting system for stormwater BMP retrofit needs within a watershed. A watershed analysis indicates how many BMP Gallons are required by subwatershed and from landuse types in order to achieve watershed goals. The stormwater utility in the watershed implements a tiered cost program where parcels meeting BMP Gallon goals pay a lower rate than parcels

that do not meet BMP Gallon goals. Once a parcel implements appropriate BMPs on-site, the stormwater utility rate for the parcel is decreased.

Single Buyer

In this model, a single entity buys credits, such as Quality Gallons, from one or more other parties. The buyer will typically be expected to hold a stormwater-related permit, or otherwise have stormwater management responsibilities, but as discussed earlier, the buyer also could be undertaking voluntary actions. The seller(s) will either have no stormwater management responsibilities, or will have done better than required to satisfy the seller's compliance obligation (in addition to, or in lieu of on-site actions). Illustrations of this model include the following:

- A single developer fulfills stormwater requirements through a combination of on-site BMPs and credit purchases, or entirely through credit purchases from individuals or a regional entity, as allowed by the program
- A city with combined sewers serving a sub-watershed, institutes a program where it buys credits on a rolling basis at a pre-set price from landowners that perform retrofits or install new BMPs above and beyond their requirements with the objective of generating landowner incentives for greater on-site controls and reducing flows to the combined sewer system
- A stormwater utility takes some of its resources and annually holds a "reverse auction" where landowners, non-profits, and contractors can submit bids to construct and maintain various stormwater BMPs—the bids are ranked based on cost-effectiveness of the Gallons or Quality Gallons promised, along with other key factors, and funding is awarded to the top-ranking bids
- A non-profit environmental advocacy organization, fulfilling a broad stewardship mission, launches a program to buy credits from landowners as a way of targeting BMPs in locations that the organization could not reach otherwise

Single Seller

In this model, a stormwater permittee that does better than its own compliance obligation, or unregulated entity with no stormwater management obligations, sells credits, such as Gallons or Quality Gallons, to one or more other parties that cannot or chose not to fulfill their responsibilities on-site. Illustrations of this model include the following:

- A developer of a large property, such as a subdivision or commercial complex, does better than the stormwater requirements and sells credits back to the stormwater management agency or to multiple smaller developers that cannot fulfill their on-site obligations as cost effectively
- A county conducts a major restoration of stream and treatment wetland complex, in effect creating a giant BMP for a sub-watershed with additional flow and treatment control than previously existed, which is not required under its own stormwater permit, and sells credits to developers that elect to take the in-lieu-fee option the county offers

- A stormwater utility sells credits to small developers that would otherwise be installing small, isolated BMPs that do not have good maintenance track records, and uses the proceeds to fund several regional BMPs, or BMPs in target locations that are above and beyond those required for its own regulatory compliance
- A non-profit fulfilling its stewardship mission related to habitat documents the stormwater credits it creates and uses the proceeds to support larger projects than it otherwise could
- A for-profit entrepreneurial firm acts as a syndicate, signing up "subscribers" for stormwater credits, and develops creditable BMPs to meet the aggregate demand

Multi-Buyer/Multi-Seller

As implied by the name, this model defines a broader market, in terms of participants, number of transactions, and types of arrangements ongoing over a defined space and time period. This model could describe the following types of programs:

- Situations where landowners conduct credit transactions directly with each other, in a stand-alone program, or as part of other options as described above
- An exchange system implemented under a watershed permit, where a wide variety of permitted and un-permitted sources, including even wastewater treatment facilities, may trade credits with each other
- Multi-credit opportunities, where a permitting or other framework supports recognition of more than one ecological currency in a way that increases the potential buyer pool and raises the revenue opportunities as those that create stormwater credits could also sell habitat, carbon, or other recognized credits.

Implementation Steps

In order to evaluate whether a market-based program is appropriate for a watershed or community, it is important to consider a number of different elements. Important factors in determining which elements and model features are right for a given situation include:

- Regulatory framework and drivers for stormwater practice implementation
- Number of dischargers/sources
- Number of potential sellers versus buyers
- Geographic layout of the watershed and the sources
- Relationships between and among potential traders
- Relationship between potential traders and state regulatory agencies
- Magnitude of required reductions
- Potential availability of credits
- Number and frequency of anticipated trading transactions
- Transaction costs faced by buyers and sellers
- Resources needed to set up and maintain the trading system
- Market oversight requirements

These elements are often best evaluated in the context of a feasibility study, followed by a pilot study to gauge program effectiveness and if successful, to prepare for a larger implementation program. A thorough evaluation of market-based trading will:

- Examine market elements and features of models
- Evaluate the relative costs and benefits of alternative approaches
- Select those that work best for the community given the situation in their watershed
- Choose an overall approach appropriate for the communities' situation and preferences

Commonalities of Successful Incentive and Market-Based Approaches toward Achieving Watershed Goals

Successful incentive and market-based watershed regulatory mechanisms have common elements that, in one form or another, recognize that pollution trading efforts can create unintended or undesirable consequences if not managed correctly, but incorporate the following:

- A regulatory driver with a specific, quantifiable outcome(s) that must be met before an activity can proceed
- A flexible regulatory framework that utilizes market-based forces to encourage efficient use of resources to achieve the desired environmental outcome(s)
- Adequate up-front regulatory information to reduce time and cost uncertainties such that potential private developers/investors can relatively quickly assess the economic viability of alternative projects (for example, the metrics or currency used to purchase, trade or transfer values [credits], the availability of willing sellers, and market mechanisms to facilitate these transactions).
- An economic benefit of those regulated that encourages voluntary use of a market-based option (for example, greater long-term return on investment or short-term reduction in costs related to time and/or uncertainties in receiving approvals)
- Provisions that minimize the likelihood of unintended consequences that would simply redistribute and/or concentrate the environmental impacts, or impair attainment of other equally valuable environmental objectives

Conclusions

Alternative funding mechanisms provide the opportunity to implement stormwater BMPs to restore flow regime and improve ecosystem function. A system of incentive and market-based stormwater management regulations could allow for greater BMP implementation at a lower overall cost. Some potential outcomes could include greater development intensity for some sites in exchange for offsite improvements in stormwater management. The increased flexibility available through incentive and market-based approaches would encourage higher utilization of the most developable parcels while meeting requirements to reduce stormwater runoff and achieving other environmental goals such as protecting some areas from development, improving water quality, moderating temperature, and restoring fisheries and wildlife habitat.

The challenge with incentive and market-based watershed management approaches is to develop a regulatory approach that incorporates the successes of other incentive and market-based environmental areas. A successful program will be able to facilitate the stormwater BMP implementation needed to protect and restore ground and surface water flow regimes in developed and developing urban areas. The potential for success in using incentive and market-based stormwater BMP funding increases when steps are taken to reduce the time and effort needed to implement a transaction.

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Appendix 5A
Funding Options Summary

APPENDIX 5A

Funding Options Summary

Local General and Restricted Revenue

Most stormwater management activities are usually funded through locally generated revenue or regulations. In some cases, general fund revenue (for example, property, income and local sales taxes, and state revenue sharing funds) have been used directly to construct and operate stormwater facilities through either an annual operating budget or the financing of general obligation bonds. In an increasing number of communities, restricted income in the form of special property assessments (for example, drainage districts, special improvement districts, conservancy districts, etc.), development impact fees, or stormwater utility fees have been used directly or in combination with revenue bonds to construct and operate stormwater management facilities. Recent stormwater permit requirements have prompted local governments to seek new sources of revenue or expand existing sources to meet new stormwater requirements. Across the country, stormwater utilities are becoming an increasingly popular source for funding required stormwater management activities. A growing number of local stormwater utilities have been created in response to Phase I and Phase II federal stormwater discharge requirements with some experts projecting that as many as 2,000 local stormwater utilities will be in operation in this country by the year 2010 (Woolson, 2006).

Limitations

In some states, such as Michigan, the use of stormwater fees based upon property assessments have been restricted by court decisions that severely constrain the creation of stormwater utilities (Bolt v. City of Lansing, 1997). Many local units of government, particularly older, fully developed communities are facing reductions in local revenues and are finding it difficult to obtain the required support of elected officials or voters to increase taxes, fees, or property assessments to sustain even existing levels of public services let alone new services. Local revenue sources alone will likely be inadequate in many, if not most, communities to fund the stormwater Best Management Practices (BMPs) needed to address existing excessive runoff or groundwater depletion impacting the biological habitat of downstream watercourses.

State and Federal Grant Programs

Some states have specific grant programs to assist local communities in the implementation of the water quality improvement or watershed management projects. For example, in Michigan, the City of Livonia has already used a combination of a federal grant (Rouge River National Wet Weather Project), a state grant (Clean Michigan Initiative), and local funds including city-owned land, to build an off-channel regional stormwater detention facility along the Bell Branch of the Upper Rouge River. This facility, described in Chapter 3 of this report, has been designed to partially restore natural flow regimes and reduce downstream flooding, bank erosion, and aquatic habitat damage.

Most states administer pass-through, federal matching grant funds to assist in the preparation and implementation of watershed management plans through U.S. Environmental Protection Agency (USEPA) nonpoint pollution control activities under Section 319(h) of the Clean Water Act (USEPA, 2006a). State agencies use Section 319(h) funds for grants to local agencies and nonprofit organizations for nonpoint and stormwater management provided that the activity is not specifically required by, or directly implements, National Pollutant Discharge Elimination System (NPDES) stormwater permit requirements. Presumably, planning and implementing BMPs designed to reduce downstream flooding, minimize bank erosion, and lessen impacts on aquatic habitat would qualify for grant funding. Section 319(h) requires at least 40 percent nonfederal matching funds for the total cost of a grant project.

The critical issue for implementing flow regime restoration projects under Section 319(h) may be whether or not such flow enhancement projects are specifically required under an NPDES stormwater permit or directly implement a provision of a requirement. Section 319(h) grants can not be used to meet NPDES permit requirements. Under federal stormwater NPDES requirements, flow regime enhancements to address existing flow impairments are not specifically required. However, postconstruction stormwater regulation associated with new developments is required. States may have additional requirements.

For example, under Michigan's watershed-based option for its municipal stormwater discharge general permit, watershed management plans are required. Depending upon how specific the actions are identified in the watershed plan, Section 319(h) funding may be available for flow enhancement BMPs.

Federal consolidated block grants or specific categorical federal grant funds are available in certain circumstances to assist local governments in stormwater BMP implementation. For instance, the federally funded Rouge River National Wet Weather Demonstration Project (www.rougeriver.com) has provided matching funds for stormwater BMP demonstrations in the Rouge River watershed in southeast Michigan including the Idlewild off-channel stormwater regional detention facility located on the Upper Rouge River in the city of Livonia described in Chapter 3 of this report.

Limitations

Categorical federal and state grant programs have limits both on the dollar amounts and the number of years they are available. The competition for federal block grant dollars, and similar state grants, limit their availability for stormwater management projects. While state and federal grants can be useful, they often represent one time event funding rather than a long-term, reliable means to facilitate watershed-wide efforts to address resource impairments resulting from disruption of groundwater and surface water flow regimes.

Federal Projects

In addition to grants, there are federal projects like those of the U.S. Army Corps of Engineers (USACE), particularly projects authorized under the Water Resource Development Act (WRDA) (for example, Sec. 506 of WRDA 2000, Great Lakes Fisheries and Ecosystem Restoration [GLFER], and Sec. 206 WRDA 1996 Aquatic Ecosystem Restoration)

that focus on restoring ecosystem components including flow regimes (USACE, 2006). While the GLFER program is just underway, it offers a new potential source of federal funds for stormwater BMP implementation designed to address river ecosystem impairments caused by natural flow regime alteration.

The recent draft report of the Regional Great Lakes Collaboration lead by USEPA under a presidential executive order recommended full funding of the authorized $100 million GLFER Program (USEPA, 2006b). The Regional Great Lakes Collaboration report also included a recommendation for a new federal initiative to address flow regime problems in urbanized watersheds of the Great Lakes.

Limitations

Nationwide competition for funding under the USACE Aquatic Ecosystem Restoration program limits the dollars available in the Great Lakes region, and the new USACE GLFER program, although authorized for $100 million, still needs to be fully funded by Congress. Federal projects also require nonfederal dollars or in-kind contributions (for example, 35 percent nonfederal match for WRDA Section 506 and 206 projects) that may limit participation.

Nonregulatory Private Funding

Businesses, corporate, and private foundations, and other private organizations often fund projects that are designed to enhance or restore natural resources particularly where public resources for such projects are limited or not available and where locally based advocates are the project sponsors. Nonprofit conservation or environmental organizations, rather than public agencies, are often the project sponsors and recipients of these types of private funds. Funding from the types of organizations listed in Table 5A-1 have supported both specific habitat restoration projects as well as watershed planning and research efforts, and many specifically target the Great Lakes and tributaries as a priority environmental focus area.

Private funding sources can be particularly valuable where local, state, and federal public resources are insufficient to complete a restoration project and/or to realize the full potential environmental benefits. In some cases, private sources of funding can provide critical leverage to secure matching funds needed to meet public environmental grant requirements.

Limitations

Private nonregulatory sources of funding to support BMPs that address flow regime enhancements is probably limited to a supporting or complementary role to other sources of primary funding. Finding a private funding source that is interested in supporting stream flow and related habitat enhancements in a particular watershed as well as finding a local nonprofit organization willing to take on the responsibility as project advocate and sponsor may be difficult in some geographic areas.

TABLE 5A-1
Examples of Private Funding sources for Stream Flow Rehabilitation

Organization	Description
American Rivers	Funds projects involved with protecting and restoring healthy natural rivers and sustained benefits for people, fish, and wildlife.
Fish America Foundation	Funds on-the-ground habitat restoration, which demonstrates significant benefits to marine, estuarine, or anadromous fisheries resources, particularly sport fish.
Great Lakes Fishery Trust (GLFT)	Funds nonprofit organizations and government entities for, among other things, protection and enhancement of habitat in the Great Lakes and tributaries
Great Lakes Protection Fund (GLPF)	Seeks projects that lead to tangible improvements in the health of the Great Lakes ecosystem, promote the interdependence of healthy ecological and economic systems, and that are innovative, creative, and venturesome.
National Fish and Wildlife Foundation (NFWF)	Funds projects to conserve and restore fish, wildlife, and native plants through matching grant programs. The foundation awards matching grants to projects that address priority actions promoting fish and wildlife conservation and the habitats on which they depend.
Private Foundations with focus in Great Lakes region	Among other things, fund habitat and ecological restoration in Great Lakes region. (for example, C. S. Mott Foundation, Joyce Foundation, Frey Foundation, Wege Foundation, Beldon Fund, Gund Foundation)

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Appendix 5B
Developer Stakeholder Survey Results

APPENDIX 5B

Developer Stakeholder Survey Results

CH2M HILL MARCH 28, 2006
Builders Association Survey Results

	Average Response
PART A	
Please indicate the potential influence of the following uncertainties and impediments on your development projects on a scale of 1 to 5 with 1 being no influence and 5 being high influence.	
Regulatory	
Approval uncertainty	4.8
Permit delays	4.4
Enforcement actions	2.8
Duplicate regulatory authority	3.4
Local Jurisdiction	
Zoning requirements/restrictions	4.7
Building density restrictions	4.1
Approval timeframes	4.4
Others	
Other:	
Other:	
PART B	
Please indicate which potential incentives to promote watershed ecosystem restoration are most meaningful to your development projects on a scale of 1 to 5 with 1 being no potential and 5 being high potential.	
Green Tier—Tier 1	
Single point of DNR contact	4.5
Environmental recognition (positive PR)	3.6
Deferred enforcement	3.5
Green Tier—Tier 2	
Faster permit reviews	4.9
Customized regulatory solutions	4.4
Others	
Reduced application fees	2.9

CH2M HILL MARCH 28, 2006
Builders Association Survey Results

	Average Response
Expedited review process	4.8
Property tax credit	3.0
Access to low interest loans	2.3
Stormwater trading (free up developable land by meeting minimum stormwater requirements onsite, provide higher requirements offsite)	4.1
Flexible zoning - allow higher density	4.6
Flexible zoning - smaller parking lot size	3.3
Flexible zoning - greater building footage	3.9
Other:	
PART C	
Given the appropriate incentive, please indicate which practices consistent with watershed ecosystem restoration you would consider in conjunction with your development projects on a scale of 1 to 5 with 1 being no potential and 5 being high potential.	
Onsite BMPs	
Exceed stormwater management requirements	3.6
Provide additional information	3.6
Stream (restoration (i.e. re-meandering a stream)	3.1
Better water quality (additional TSS removal)	3.6
Implementing rain gardens on each property	3.1
On redevelopments: placing BMPs to treat existing impervious area	3.4
Offsite BMPs	
Stormwater retrofit other properties	3.0
Contribute financially to a watershed restoration fund	2.6
Funding local governments to construct retrofit BMPs	2.9
Other:	
PART D	
Given the appropriate incentives, please rate your willingness to fund offsite stormwater BMP retrofits, (1 being not willing and 5 being highly willing):	
Design and construct the BMPs yourself or through your consultant	2.9
Just contribute financially and have someone else design and construct the BMPs	2.5

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