

## **Sustainable Raritan River Initiative**

**November 2009**

### **Improvements to Water Quality, Stormwater, and Infrastructure**

#### **Introduction**

In May of 2009, the first annual Sustainable Raritan River Summit was held for the purpose of invigorating key stakeholders to develop action agendas and implementation projects for watershed improvement. The agendas and implementation projects identified throughout the course of the Summit were partially based upon past work that had been completed in the watershed, in particular the 2002 Raritan Basin Watershed Management Plan developed under the leadership of the New Jersey Water Supply Authority<sup>1</sup>. Additional priorities were developed during collaborative breakout sessions included as part of the Summit. All priority agendas and projects were grouped into five categories: Hazardous Sites and Sediment Cleanup; Water Quality, Stormwater and Infrastructure; Habitat Preservation and Resource Stewardship; Greenways, Recreation and Public Access; and Balancing Redevelopment and Restoration.

The Summit resulted in the formation of a working group for each of the five categories listed above. The goal of each of these working groups was to develop a white paper that identifies several objectives and associated tasks that should be addressed within the coming year. This is the white paper that the Water Quality, Stormwater, and Infrastructure Working Group assembled. This white paper focuses in large part on several goals outlined in the 2002 Raritan Basin Watershed Management Plan, which involved substantial effort and input from many stakeholders throughout the region. It is important to note that during the breakout sessions at the Summit, the Water Quality breakout groups' list of priorities closely matched the priorities and goals outlined in the 2002 Raritan Basin Watershed Plan.

The Working Group identified three objectives for this white paper/action plan to achieve improvements in water quality and stormwater management within the Basin. These objectives are described below along with tasks that need to be accomplished to achieve each objective. These objectives cannot be completed in isolation but rather can only be completed by working closely with the partners in the Raritan Basin. The hope of the Sustainable Raritan Summit and the subsequent Sustainable Raritan Initiative was to provide a forum to bring together various partners to make the whole much bigger than its individual parts. Only through working together can we create a Sustainable Raritan River.

#### **Background**

The Raritan River Basin is the largest watershed located entirely within New Jersey. It encompasses over 1,100 square miles of the State with approximately 1.2 million people living

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<sup>1</sup> <http://www.raritanbasin.org/>

within the Basin boundaries. The River itself provides a source of drinking water, recreational activities, and transportation; it is essential to the quality of life in the region.

Today, the Raritan River suffers from the impacts of point and nonpoint source pollution. Stormwater runoff, effluent from wastewater treatment plants, historic contamination from previously operating industrial facilities, and illicit discharges from facilities currently in operation all threaten the overall health of the watershed. Additionally, there are approximately 1,900 known contaminated sites in the Basin, and over 60 Superfund sites are located within one mile of this valued waterway. Because so many rely on the natural resources of the River, there is a need for more focus on improved water quality and overall restoration efforts throughout the Basin.

In 1999, stakeholders from around the Raritan Basin joined efforts to create the Raritan Basin Watershed Management Project (a.k.a Raritan Project). The stakeholders included representatives from Federal, State, county and municipal government and from local nonprofit organizations. The first priority of the Raritan Project was to characterize and assess the watersheds within the Basin to determine the current status of the environment and how that status compared to community goals and to adopted standards in New Jersey. A series of characterization and assessment reports were prepared by the stakeholders. The stakeholders then joined efforts to develop a comprehensive management plan for the Raritan River Basin to address issues such as surface water pollution, loss of riparian habitat, biological impairments, and stormwater impacts. Led by the New Jersey Water Supply Authority (NJWSA) and partially funded by the New Jersey Department of Environmental Protection (NJDEP), the Raritan Basin Watershed Management Plan was published in 2002 ([www.raritanbasin.org](http://www.raritanbasin.org)) with overarching goals and strategies to implement restoration programs throughout the watershed. The primary purpose of this white paper is to advance key initiatives identified in the 2002 Watershed Management Plan for the Raritan Basin and build on the existing programs advocated by the stakeholders.

### **Problem Statement**

In the Raritan Basin, the pollutants that most frequently exceed the surface water quality standards are phosphorus and fecal coliform. Phosphorus stimulates excessive growth of aquatic plants and algae, causing eutrophication of water bodies. While phosphorus occurs naturally from the weathering of some rocks and sediments, major sources include agricultural and lawn fertilizers and treated wastewater effluent. Fecal coliform bacteria signify the presence of waterborne disease-causing bacteria and viruses from the digestive tracts of mammals. Fecal coliforms in water may come from the discharge of untreated wastewater from failing septic systems or sewer line breaks, or from wildlife, farm animals and pets. When fecal coliform concentrations exceed the surface water quality standards, the water is unsuitable for swimming and other primary contact recreation. Besides total phosphorus and fecal coliform, other water quality problems are present in localized areas of the Basin. At some sampling sites, the pH is either too high (basic) or too low (acidic), some of which may be

a natural condition. In the Upper Raritan Water Management Area, some trout waters exceeded acceptable temperature levels. A few pesticides have been detected above human health criteria in the Stony Brook, Neshanic River and in the Raritan River at Bound Brook. Fish tissue samples in lakes indicate bioaccumulation of mercury. NJDEP is doing further analysis of heavy metal levels, including mercury, in the Basin.<sup>2</sup>

The ever-increasing use of water resources is closely linked to the degradation of water quality. The finite availability of freshwater, coupled with the demands placed on watersheds for drinking water supply, irrigation, etc., generate the need for improved management to prevent regional shortages and avoid the ecological impacts of water over-use. Because the Raritan Basin supports a variety of ecological systems and provides both potable and industrial-use water, it is critical to understand the water quantity situation within the Basin to manage and protect the resources accordingly.

Poor water quality inevitably contributes to poor human and ecosystem health. Pathogens, heavy metals, nutrients, and other contaminants threaten those who utilize the polluted water resources for drinking water and recreational activities. Because over one million people live within the Raritan River Basin, demands on the water resources are also a concern. It is vital to monitor, evaluate and improve the current water quality and water quantity status so as to protect human well-being and ecosystem health. Three key priorities have been identified as measures necessary for the improvement of water quality and quantity management within the Raritan Basin. They include: stormwater utility programs, educational and outreach programs, and the development of small-scale watershed restoration plans.

## Strategic Objectives and Tasks

### ***Stormwater Utilities for New Jersey Municipalities***

#### **Background**

Demands of aging infrastructure, new stormwater quality requirements, and the collective impacts of urban sprawl are causing municipal governments to develop stormwater programs that resemble water and wastewater utility systems. Stormwater utilities are designed to generate revenue to support the majority of a stormwater management program in a municipality. All revenue generated goes directly to manage, repair, and improve the system. The utility fees are administered separately from the general tax fund, ensuring stable and adequate funding for these public services<sup>3</sup>.

The magnitude of the utility fee is typically determined based on the percentage of impervious surfaces covering an individual's property (i.e., the amount of stormwater runoff a parcel of land contributes to the system). Some programs provide credit to reduce utility fees for

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<sup>2</sup> Portrait of a Watershed, 2002.

<sup>3</sup> NRDC Stormwater Strategies: Community Response to Runoff Pollution, 1999.

homeowners or business owners who implement stormwater best management practices to promote filtering and infiltration of stormwater runoff. Through these credit programs, homeowners are encouraged to actively reduce the quantity and improve the quality of stormwater entering the municipal system.

Stormwater utilities are a relatively recent development in municipal stormwater management. The first were developed in Colorado and Washington in the early 1970's. By 1980, more than 20 cities and counties established utilities in Washington, Oregon, Colorado, and Utah<sup>4</sup>. It is estimated that by 2020, more than 10,000 utility programs will be in existence across the country<sup>5</sup>.

### **Identified Constraints**

Political and public opposition is common when a new financial burden is proposed. It is highly important to gain stakeholder and community acceptance of a stormwater utility program, as this will foster political support and ultimately the implementation of the program. Gaining both stakeholder and community approval will involve research into the specific stormwater needs of municipalities in addition to general public education, interaction, and participation in the process of developing the utility program.

Funding to develop pilot stormwater utility programs will be necessary. While this may be a serious constraint in light of the current economic environment, it may be possible to acquire funds in the form of grants, loans, or matching funds from State or Federal agencies, including established utility authorities. Well-researched stormwater utility action plans will be important when submitting grants or lobbying for funds.

***Objective 1: Educate local, county and State stakeholders on the need for Stormwater Utilities. Develop a pilot program for the implementation of Stormwater Utilities.***

### **Tasks**

- 1. Assemble a team of experts to deliver educational and outreach programming on stormwater utilities to stakeholders and the public in the pilot area.** This will most likely require assistance from individuals in local government, Rutgers University, and watershed groups who support the program and are knowledgeable about the pilot area, stormwater utilities, or both.
- 2. Identify a pilot area in the Raritan River Basin where a stormwater utility program could be formed and assess community stormwater needs.** An ideal pilot area would be a municipality in which existing data related to their stormwater needs is easily gathered. Sources of this data include complaint records, stormwater and maintenance

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<sup>4</sup> Florida Stormwater Association, 2003.

<sup>5</sup> CSI Utility, 2007.

staff experience, previous studies, and field measurements. This information allows for the identification of problem areas for priority listing. In addition, analysis of administration, Federal stormwater permit compliance, engineering, planning, regulation, enforcement, monitoring, and capital improvements are also important elements to consider when choosing a pilot area.

- 3. Engage in the Stakeholder Support Process.** A stakeholder committee that includes public, commercial, governmental, and environmental groups or individuals affected by the program is vital to the implementation of the program. The stakeholder committee is facilitated to achieve consensus on the goals of the program, as well as each product of the community acceptance process. The benefits of a stakeholder committee include the preliminary distribution of information to a smaller, more focused group. This provides meaningful feedback from representatives of the public prior to full public distribution and also encourages the development of a support group.
- 4. Develop the Stormwater Utility Plan.** This includes determining the rate structure for the pilot area, billing structures, economic analysis, credit assessments, collection methods, enforcement, and identifying sources of technical assistance.
- 5. Develop a Public Awareness and Acceptance Plan.** This involves the development of public educational materials that target specific groups which include elected officials, focus groups, and the news media. It may also involve neighborhood meetings, the distribution of educational videos or brochures, public workshops, and public opinion surveys.
- 6. Develop a marketing plan and education outreach program for other municipalities in New Jersey.** This will include writing editorials for local papers, speaking at public events, and using the connections of University faculty and watershed groups to educate local officials and politicians on the benefits of stormwater utilities. The development and dissemination of educational programming can be accomplished largely through the efforts of groups affiliated with Rutgers University, including New Jersey Public Interest Research Group (NJPIRG) and Rutgers Cooperative Extension.

### **Evaluation Tools**

There are several evaluation tools available to quantify the success of stormwater utilities with respect to water quality improvements. Because credits are given to homeowners or business owners who implement stormwater best management practices, the increased number of disconnections, stormwater structures, etc. can be recorded and used to estimate water quantity and quality improvements due to utility implementation. Additionally, interviews with municipal stormwater engineering and maintenance staff will provide insight into infrastructure upgrades and flooding control programs funded with the revenues generated by the stormwater utility.

The education component of this objective can be evaluated with pre- and post- surveys for the targeted groups which will gauge their attitude towards and knowledge of stormwater utilities.

This data will provide educational metrics for the utility program and will allow for the adjustments needed to gain community acceptance and understanding.

## ***Development and Implementation of Watershed Restoration and Protection Plans at the HUC-14 Scale***

### **Background**

To mitigate the impairments facing the Raritan River Basin and to protect its water resources, the NJDEP and the New Jersey Water Supply Authority jointly funded the development of a Basin-wide Watershed Management Plan. Between 1999 and 2002, stakeholders from the North and South Branch Raritan Watershed Management Area (WMA 8), the Lower Raritan Watershed Management Area (WMA 9), and the Millstone River Watershed Management Area (WMA 10) collaborated to identify major issues to be addressed by the Watershed Management Plan. Extensive characterization and assessment of the entire watershed was completed as a component of the project, and nine technical reports were produced as a result. These reports provide information on groundwater, landscape, physical setting, surface water quality, riparian areas, permitted and non-permitted loads, water quality status, water budgets, and water supply within the Raritan River Basin.

The Watershed Management Plan itself highlights goals, objectives, and implementation strategies on a Watershed Management Area-scale based on the findings included in the technical reports. It provides thorough management strategies for WMAs 8, 9, and 10. Each strategy includes problem statements, goals and objectives, named actions, evaluation processes, responsibilities, constraints, milestones, and funding needs. These strategies are only broadly applicable and are not necessarily area-specific. They do, however, provide an excellent foundation for the development of watershed protection and restoration plans on a HUC-14 scale, as opposed to the basin-wide approach. Small-scale, locally managed projects are often more feasible for implementation as funding sources and focused objectives are easily maintained. Once the plans are developed, implementation projects can be identified and undertaken. Current approved plans for sub-watersheds within the Raritan Basin include Mulhockaway Creek Stormwater Management and Water Restoration Plan, Delaware and Raritan Canal Tributary Assessment and Nonpoint Source Management Project Watershed Restoration and Protection Plan, and the Sourland Mountains Watershed Protection Plan.

### **Identified Constraints**

During the 1990s, NJDEP delineated the State into five major water regions (Atlantic Coast, Lower Delaware, Northeast, Northwest, and Raritan) which include 20 watershed management areas. Along and within these watershed boundaries, approximately 60 grassroots watershed protection organizations that cross municipal boundaries existed or have formed with the goal of restoring and protecting watershed areas ranging from several square miles to several hundred square miles. Most of these organizations, including those within the Raritan Basin, are non-profit and comprised mostly of volunteers. Budgets and manpower, therefore, are

limited and are typically not enough for them to actualize significant water quality improvement. In addition, they may require technical assistance to bridge the gap between their current resources and those required to achieve their respective goals.

***Objective 2: Promote the development of watershed restoration and protection plans at the subwatershed scale (HUC-14) and implement these plans. The Raritan Basin Plan is a broad scope study that can help us characterize the watershed.***

### **Tasks**

- 1. Compile a list of completed and on-going restoration plans and implementation projects within the Raritan River Basin.** Many agencies and groups within the Raritan River Basin have already begun restoration with a small-scale approach. The Upper Raritan Watershed Association, the South Branch Watershed Association, the Stonybrook-Millstone Watershed Association, and the North Jersey Resource Conservation and Development Council actively conduct and participate in conservation, monitoring, and educational and stewardship activities relating to the Raritan River Basin. The Raritan Basin Alliance is a collaboration of stakeholders who strongly influence water resource management within the watershed. The Alliance functions to fulfill two main responsibilities: attracting resources to implement Raritan Basin projects and coordinating efforts to use those resources effectively. It is comprised of a variety of governmental, nongovernmental, and private sector interests who dedicate their efforts toward program coordination, nonpoint source identification, and stream corridor restoration. The completed and on-going projects related to the aforementioned groups can serve as examples of what activities should be undertaken in the future. A list of plans and projects can be found in the 2009 report "The State of the Raritan River: A Work in Progress."
- 2. Assemble a list of other identified watershed areas in need of a restoration or protection plan.** The Raritan Basin Watershed Alliance has completed a Geographic Information System analysis and classified each HUC-14 as either healthy, under pressure, or in need of restoration based on a certain set of parameters. NJWSA has also previously identified HUC-14 areas in need of regional stormwater management plans. This step will involve the compilation and prioritization of these identified areas. Input may be required from faculty and staff at Rutgers University, from representatives of established watershed groups, and from municipal stakeholders, public officials, or members of the general public.
- 3. Host technical workshops on the development of watershed restoration plans.** To provide technical knowledge and skills to those interested in developing watershed restoration plans, a series of workshops or presentations will be provided by the team. The Rutgers Cooperative Extension Water Resources Program is already in the process of developing a program focused on providing enhanced interactive learning opportunities to empower citizens to become more actively involved in watershed

planning and protection within their communities. This program can be combined with a series of lectures given by experts from specific areas of the Raritan River Basin to not only provide overall general knowledge about watershed planning but also include specific details on impairments, data gaps, and potential projects within the Basin itself. These workshops will facilitate the building of coalitions to develop plans that can be completed with a reasonable budget and to identify alternative funding mechanisms, as NJDEP is not currently funding restoration plans.

- 4. Identify priority implementation projects from all plans that can be implemented by stakeholder groups.** This will be done by the team of experts organized at the beginning of this endeavor, with a conscious effort to include priority projects from the Upper, Lower, and Bay regions of the Raritan River Basin.
- 5. Organize groups of community volunteers and stakeholders to complete necessary plans.** These volunteers may be recruited at the technical workshops and from student groups at Rutgers University. Already-established watershed organizations will contribute significantly to the volunteer efforts in the Raritan River Basin, as well. They will be responsible for carrying out tasks identified in each of the plans and reporting progress on a quarterly basis. A master list of projects from all plans will be maintained to track implementation progress and restoration success.

### **Evaluation Tools**

Baseline data on the water quality of the Raritan that was gathered by volunteers, watershed organizations, United States Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), NJDEP, and other agencies prior to the watershed planning efforts and project implementation will be reviewed and compared to the data collected post-project implementation. This comparison will demonstrate the success of the watershed restoration projects and highlight areas that are in further need of planning efforts.

A large component of this task involves public awareness and education. Follow-up surveys, interviews with volunteers involved with the planning and project implementation, and pre-and post-tests for the workshops will provide a detailed means by which public education programs can be evaluated and improved.

### ***Educational and Outreach Programming on the Raritan River Basin***

#### **Background**

“The threats facing the Raritan include over 150 significantly contaminated sites, the legacy of its industrial heritage, and stormwater runoff that erodes riverbanks and brings trash and pollutants into the waterway, the legacy of antiquated infrastructure in a highly urbanized region. Yet the River basin also has spectacular natural areas, wildlife habitat, trails and recreational boating areas, along with scenic waterfront redevelopment opportunities that

create the potential for long-term balance and sustainability for the River and the towns that border it.”<sup>6</sup>

The goal of the Sustainable Raritan Initiative is to restore and revitalize the natural resources associated with the Basin. This can only be accomplished with the behavioral changes of the over one million Basin residents who contribute to its degradation. Educational and outreach programming can bring knowledge and awareness to large numbers of citizens and promote the behavioral changes that are necessary to achieve overall improvements in the Basin.

### **Identified Constraints**

Because the Raritan Basin is such a large watershed, environmental concerns and impairments differ from region to region due to varying levels of development and pre-existing conditions (e.g., soil type, geographic features). Therefore, programming specific to different regions or watershed management areas must be developed and applicable to a wide-range of knowledge bases. Despite the specificity of the programs developed, they must communicate the goal of restoring and preserving the River as a whole. The cost of researching existing programs, developing new outreach programs, and delivering them to the public will be costly and time-consuming. Teams of stakeholders from throughout the watershed should be assembled to ensure representation for WMAs 8, 9, and 10 when developing the educational material. Existing programming and its documented impact can be used as leverage when applying for funding from Federal or State governmental agencies.

***Objective 3: Develop and deliver educational and outreach programs throughout the Raritan River Basin to increase knowledge and awareness and to promote behavior changes needed to achieve the overall Sustainable Raritan Initiative goal.***

### **Tasks**

- 1. Compile a list of Education and Outreach Programs that are currently being offered in the Basin.** The list should include a description of the program, program leaders, funding sources, and typical attendance rates. This research could potentially be conducted by student groups associated with Rutgers University.
- 2. Assemble a team to determine the educational messages and behavior changes needed to improve water quality in this Basin.** This team would be comprised of stakeholders and watershed organization members from throughout the Basin. Representatives from local governments and community groups would also provide useful insight during the process of program development. The team would also be responsible for reviewing the compiled list of existing programming and then developing a comprehensive plan for incorporating them into new programming for maximum

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<sup>6</sup> Sustainable Raritan River: A Work in Progress, 2009.

public impact. The team will also be responsible for media coverage and promotional tactics to engage public interest in environmental concerns related to their area.

3. **Deliver the educational and outreach programming.** Rutgers Cooperative Extension has extensive experience in both developing and delivering educational programming to the public and can provide guidance throughout the process. The programming should target all age groups.
4. **Serve as a clearinghouse for educational and outreach programs for the Basin.** The Sustainable Raritan River Initiative can provide a clearinghouse service to schedule and organize all programming. This will prevent duplication of efforts and provide easy access to information for the general public.

### **Evaluation Tools**

Some programming can be successfully evaluated using pre- and post- tests administered to the participants. Results of these tests indicate the knowledge gained from the educational materials provided. Follow-up surveys can also be conducted one to two months afterwards to determine if behavioral changes occurred because of attending the programs and if not, for what reasons. Program educational materials will then be modified to achieve the desired impact on the public.

### **Budget**

A budget is presented below to help the reader recognize the approximate cost of this effort. Although many stakeholders are currently working in the Raritan River Basin on environmental issues, we cannot expect any of them to begin implementing the tasks required to complete the objectives described in this white paper without providing them funding. The budget presented below is written as if the Rutgers Cooperative Extension Water Resources Program would lead this effort, which does not have to be the case. The group leading this effort should already have technical staff and outreach educators working on water resources issues in the Raritan River Basin. This would ensure colleagues that any newly hired staff could consult on various issues. Additionally, the lead organization would be expected to dedicate some of their existing resources to provide support to these newly hired staff. Several groups within the Raritan River Basin could provide leadership for this effort.

**Estimated Budget** (\$108,820 for Year 1 and \$462,803 for the entire four years):

**Salaries:** Funding has been allocated for six months per year of a Program Coordinator to complete Objective 1: Stormwater Utilities for New Jersey Municipalities. Funding has been allocated for a full-time Program Associate to split their time between Objective 2: Development and Implementation of Watershed Restoration and Protection Plans at the HUC-14 Scale and Objective 3: Educational and Outreach Programming on the Raritan River Basin. This work will be completed under the guidance of Dr. Christopher Obropta. Since Dr. Obropta is a State-funded Rutgers employee, none of his time will be charged to the project. Funding also has been allocated for hourly students to support this effort. (\$68,500 for Year 1 and \$294,468 for the entire four years)

**Fringe:** Fringe benefits for the Program Associate and Program Coordinator are estimated at 37.2% for Year 1, 38.2% for Year 2, 39.2% for Year 3, and 40.2% for Year 4. There are no fringe benefits associated with the hourly students. (\$24,552 for Year 1 and \$110,262 for the entire four years)

**Travel:** Travel to meetings, site assessments, sampling and conferences/workshops to present results is included in the proposal. (\$500 for Year 1 and \$2,000 for the entire four years)

**Equipment and Project Supplies:** Funding has been allocated for a computer and other project supplies. (\$5,000 for Year 1 and \$12,500 for the entire four years)

**Administration:** Copy costs (\$250 for Year 1 and \$1,000 for the entire four years) and telephone services/postage (\$125 for Year 1 and \$500 for the entire four years) are also included in the grant.

**Indirect Costs:** Rutgers standard fixed overhead for State funding (10%) was applied to this project for indirect costs. (\$9,893 for Year 1 and \$42,073 for the entire four years)

## **Conclusion**

Steps taken towards restoring and protecting the natural resources of the Raritan River Basin not only benefit the residents of the Basin, but also the State of New Jersey and the country as a whole. Implementation and evaluation of the three objectives outlined above will provide insight and guidance to those undertaking the same tasks of improving water quality and watershed restoration in other regions of the State or country. With support from Rutgers University, stakeholder groups throughout the Basin, and dedicated environmental organizations, the Raritan River Basin can and will be restored to a healthy, functioning ecosystem.

## Improvements to Water Quality, Stormwater, and Infrastructure Working Group

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