

Report for 2003NJ50B: Urban Watershed Management: Increasing Public

- Conference Proceedings:
 - Pardi R., M. Sebetich and K. Swanson 2003, San Diego, A Center for Urban Watershed Studies Oldham Pond, Northern New Jersey, AWRA Annual Conference, November, 2003, abstract.
- Other Publications:
 - Pardi, R., New Jersey Watershed Management Area #4 Newsletter, two articles on various watershed issues.
- Articles in Refereed Scientific Journals:
 - Pardi, R., M. Sebetich and K. Swanson, 2004, Urban Watershed Studies An Off-campus Site in Northern New Jersey, Journal of Geoscience Education, accepted for publication May, 2004

Report Follows

DOCUMENT 2: Project Report

Project Information: **Urban Watershed Management: Increasing Public “Ownership” of Watershed Resources**

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Problem and Research Objectives: In urban environments such as most of the state of New Jersey, water resources are the subject of increasing concern, both in terms of human impacts on water quality and as the consequence of increasing demand for potable water supply. The drought of two summers’ ago served to emphasize how fragile a position we are in with respect to our water resources. While the identification and control of specific, local sources of pollution remains and will likely continue to remain a priority, it has become increasingly apparent that non-point source pollution and impacts of both the quality and quantity of water are equally important. The control of non-point source pollution has posed a serious challenge not only because the source, transport and fate of broadly dispersed pollutants is not well understood, but also because the solution clearly involves more than simply the establishment of standards and the enforcement of regulations. It is also clear that one aspect of the solution to non-point source pollution will be the education of the public, including public officials.

We proposed to demonstrate that the most effective way to increase public participation in watershed protection is to increase public “ownership” of watershed resources. This “ownership” would be obtained by the involvement of college, grade and high school students in the collection, analysis and evaluation of watershed data, directly related to current watershed issues. Local decision makers listen more intently to students than they do to professional scientists.

As stated earlier, the success enjoyed with the cleanup of the nation’s rivers by the reduction in point source pollution has not been met by comparable reductions in the reduction of non-point source pollution. That non-point source pollution consists mainly of nutrients from animal waste and fertilizers, pesticides from suburban lawns and golf courses, floatables from the urban environment, and bacteria and viruses from wildlife and pets. The solution to the control of these pollutants has been elusive and the problems faced are similar to those surrounding the issue of stream restoration as discussed by Riley (1998). Riley discusses several strategies for generating community interest and political support in urban/suburban areas. Some of those strategies – water festivals, lectures, workshops, etc. – have already been tried here and have generally failed to generate a high level of community interest or positive response from municipal government.

Numerous authors have documented the difficulty of rousing adult members of a community to take action on environmental issues, even when there is interest in the issues (Owens, 1993). It has been suggested, however, that one possible way to increase adult interest in environmental issues and participation in environmental activities is to get their children involved first; the children then involve their parents (Riley, 1998). However, there is little information in the literature concerning research done to investigate this claim. The proposed project described below is intended as a way to do that.

Methodology - We had proposed to establish a center at William Paterson University's new facility at Oldham Pond in North Haledon, New Jersey which will be dedicated to the study of urban watersheds and to the dissemination of information and tools useful to those who seek to solve issues of water quality and quantity in urban watersheds. To accomplish this phase of the project we had proposed to:

- Provide a technical resource base for educational activities at William Paterson University and for surrounding K-12 educators involved in water-related educational activities. This resource base would consist both of equipment (primarily field water quality measurement equipment) and personnel (primarily faculty and students from William Paterson University).
- Establish an accessible computer database of GIS and other water resources data for Watersheds 3, 4 and 6 that would contain any and all available data collected during the planning process currently going on for these watersheds. This computer facility would be designed to provide interactive tools for data management and exploration.
- Provide for continuous personnel support of the database and other center activities at Oldham Pond.
- Hold the first of what is hoped will be a continuing series of conferences in which anyone working on urban water quality issues could participate. These conferences would be structured to encourage the participation of professional and students, including grade and high school students working on watershed related topics.

Long term goals for William Paterson University's Oldham Pond Research and Laboratory facility include its development into a regional center (focused on Northern New Jersey) for the study of water resources and management. The drought conditions of two year's ago in the State highlight the limits of the water resources available in Northern New Jersey. In addition, there has been a decade's old pattern of abandoning smaller drinking water reservoirs and wells as they have become contaminated. These developments highlight the need to further develop our understanding, protection, and restoration of our watersheds.

The development of the Oldham Pond Research and Laboratory facility was planned to occur in stages (based in part on the availability of funding support). The first stage was to focus on establishing a capability to study the environment and ecology of Oldham Pond and its watersheds with the latest techniques. Oldham Pond and its watershed represent an urbanized system that is typically found in the developed areas of Northeastern New Jersey. Implementation of research at this facility should be applicable to similar areas in Northeastern New Jersey. The focus of these studies will be to utilize the latest monitoring equipment to train students and assemble data to improve our understanding of how urbanization and programs to restore watersheds (i.e., Non point Source Best Management Practices) impact water resources.

Principal Findings and Significance - This report is interim, including activities initiated over the past three months. Due to delays in the initiation of the grant from Rutgers University, in renovations at the Oldham Pond facility at William Paterson University and in the extent and type of funds available, alterations were made in the planning and scheduling of the project.

- Availability of the Oldham Pond Field Station – Renovations on the facilities at Oldham Pond were completed in August of 2003. Funding for the building renovations was raised by William Paterson University and the University’s Alumni Foundation. Equipment that had been ordered earlier in the year with funds from the New Jersey Education Leasing Fund Bond Act was installed at the Field Station beginning in September 2003 and has continued up to the present. The facility space is shared by the Alumni Foundation which occupies the top floor of the building with the Field Station occupying the lower level.**
- Initiation and Extent of Funding - Because funding was only made available early in 2004 and because the amount of funding was significantly reduced, we found it necessary to substantially modify our schedule and goals for the project. The narrative below will detail how that schedule was modified.**

Once funding became “officially” available we immediately began to formalize our informal contacts with local K-12 schools. Several meetings were held with teachers and administrators of Hawthorne, Glen Rock and Ridgewood school systems. The goal of these meetings, which continue to the present, was to ascertain the needs and interest of K-12 educators and the most efficient linkage between this project and their requirements. It was found, for example, that the best match between watershed issues and K-12 curriculum goals lay in the curriculum of the 4th grade and club activities in the High Schools.

After a number of meetings with K-12 teachers from Glen Rock, for example, two actions were taken:

- In conjunction with the New Jersey Community Water Watch (Ms. Kathy Quillinan had been assigned to William Paterson University by NJCWW for the 2003/2004 academic year), a series of classroom visits was made beginning in March 2004 during which Ms. Quillinan and William Paterson Water Watch volunteers made classroom presentations on watershed issues to grade-school children.
- After agreeing that “hands-on” experiences would ideally compliment classroom activities, we planned a field activity as a “shakedown” run for future field activities that would involve observations around and in a local stream – Diamond Brook in Glen Rock, New Jersey. This stream runs very close to several local grade schools, is perennial and is easily accessible from several locations including the local Glen Rock Arboretum. Volunteers linked to the Arboretum and the Glen Rock Environmental Commission were eager to participate in the field exercise. The field exercise is described in detail in the attached Appendices A & B and lessons learned are discussed below.
- Arrangements are in progress with other area schools to conduct such field exercises in the Fall of 2004.

Current Project Activities

Highlighted below are our current watershed activities related to this project:

- Although contacts with individual schools and teachers have proven to be effective and will continue, we decided that contact with several K-12 teachers at one time would be more effective in getting the word out to local schools. A 3-day workshop on Watershed Education will, therefore, be held at Oldham Pond on July 6, 7, and 8th. Drs. Michael Sebetich and Steven Vail of the William Paterson Biology Department and myself will conduct the field/laboratory workshop. The overall topics for each day will be 1. Macro-invertebrate sampling for stream water quality; 2. Chemical and physical measurements of stream water quality; and 3. Invasive species control and stream bank restoration. This grant and a grant to the William Paterson College of Education will partially support that workshop which has been coordinated by the University’s School of Continuing Education and Distance Learning
- Graduate and undergraduate student aids have begun to set up a web site that will be maintained on servers at William Paterson

and will serve as a repository for reporting on watershed activities and data collection.

- The weather station at Oldham Pond has been set up and is in operation except for a final link to a web site. This should be completed by the end of the summer and will add another dimension to our use of the Pond as a focus for watershed studies.
- Graduate and undergraduate student aids are compiling a manual of lesson plans for use by teachers that will be tested during the July workshop.

Future Project Plans

In the future we plan to:

- Continue and expand our contacts with local schools and offer to assist them with field activities similar to that reported in Appendix A. However, it is clear that the size of the groups that can be handled at this grade level will have to be reduced. We will also further explore contacts with high school ecology and environmental clubs and “Kids to Kids” programs as another avenue of broadcasting watershed activities.
- Along with the New Jersey Community Water Watch staff we plan to continue classroom activities and field activities such as River Cleanups.
- The use of Oldham Pond as a resource for undergraduate education will continue through workshops and classes held at the laboratory. These workshops and laboratories have included undergraduate majors and non-majors, independent study students, and graduate students.

Literature Cited:

Riley, Ann L., 1998, Restoring streams in cities: a guide for planners, policy makers, and citizens, Washington, D.C., Island Press.

Owens, Owen D., 1993, Living waters: how to save your local stream, New Brunswick, N.J., Rutgers University Press.

Migel, J. Michael, 1974, The stream conservation handbook. Edited by J. Michael Migel. Introd. by Nathaniel P. Reed, New York, Crown Publishers.

Gore, James A, ed., 1985, The Restoration of rivers and streams: theories and experience. Boston, Butterworth Publishers.

Appendix A. – Summary Report on first Field Activity prepared by William Paterson University Student Aid.

Appendix B – email received from Glen Rock teacher.



Figure 1. Dr. Pardi, of William Paterson University faculty showing 4th graders how to collect macro-invertebrates

WATERSHED STUDIES FIELD DAY AT THE ARBORETUM IN GLEN ROCK, NJ

Introduction

We contacted Glen Rock Schools, N.J. and after several discussions and meetings we arranged a field trip with 2- 4th grade classes as test run for future field trips. Ecology is a component of the 4th grade curriculum. A field trip was scheduled for an afternoon in May. Students walked on a rainy day from their school to the Arboretum. Overall, the field group consisted of:

- Two classes of 4th graders (46 students)

- Two teachers
- Four volunteer parents
- Two members of the Glen Rock Environmental Commission
- Two faculty members from WPUNJ
- Two WPUNJ students
- One AmeriCorp volunteer from NJ Community Watch

The AmeriCorp volunteer and some WPUNJ students had previously given the 4th grade a presentation on watershed issues at their school. The goal of this initial exercise was to evaluate the impact various activities would have on the students and to get an idea of the logistical requirements of such field exercises.



Figure 2. Dr. Sebetich, of William Paterson University faculty explaining the importance of invertebrates in lakes and streams.



Figure 3. Dr. Pardi and students of Byrd School collecting invertebrate samples in the Diamond Brook.

Goals of Activity- Aquatic and field ecology were the areas of interest; the day's program consisted of students from Byrd School, Glen Rock, NJ. The purpose was to teach 4th graders about the importance of water quality and different kinds of invertebrates that inhabit the Arboretum's water. This program was a hands-on approach for children to take part in aquatic ecology research. The water testing was

conducted with chemicals and meters to determine water temperature, pH, and nitrogen. The invertebrate sampling was conducted by collecting samples and identifying them with the use of a field identification chart. Invertebrate population can be used to determine how polluted a stream, lake or river is in addition to invertebrates. There were also other species such as frogs, fish and turtles that could be identified. Plants and animals within the Arboretum were used as part of the day's activities



Figure 4. The student's interaction with nature in the Arboretum.

Study Area-

The area of study was Diamond Brook within the Arboretum in Glen Rock, Bergen County, New Jersey. Glen Rock is a prime example of suburban sprawl, and is a microcosm for the entire region. Located on Doremus Avenue, the Arboretum is a

wetland forest with many types of vegetation. There is a spring fed pond that flows into Diamond Brook which then empties into the Passaic River about 3 miles down stream. The borough of Glen Rock purchased the land on Doremus Avenue in 1954; it became a municipal park in 1959, and is a division of the Glen Rock Park system.



Figure 5. The collecting of samples using a Surber samplers with Dr. Sebetich

Field Experience-

The program was conducted on May 19, 2004. The 46 students were divided into 4 groups, which were then rotated though each of the four field activities listed below.

- Micro invertebrate sampling and identification, stream ecology
- Water Quality
- Vegetation Identification and ecosystem

- Wildlife identification and ecosystem

The section of the Diamond Brook on the western end of the Arboretum and the pond that is located in the center of the wetland forest were used for the study. The water testing was conducted by collecting water samples in test tubes and adding different chemicals to determine the levels of bacteria or nitrogen. The students were shown how meters and colorimetric test could be used to determine temperature, pH and other variables on the water samples. The students were then asked to perform the tests themselves and the results were recorded.



Figure 6. Invertebrate samples collected in the Arboretum.

The collecting of the invertebrates was conducted by the use of a Surber sampler, sifters and cups filled with water that were used as holding tanks. The Surber sampler was

placed in the water, preferably near riffles, because of the higher concentrations of invertebrates, around and under the rock formations. The Surber samplers were emptied into sifters to conduct the search for any organisms. If any, they were placed in the watercups and identified by the I.D. chart with picture characteristics and key for invertebrates



Figure 7. Dr. Pardi explaining how to determine of water quality

Summary Evaluation-

The field trip was educational, interesting and fun for the children. The lessons learned were: The group size (46 students) was too large to handle in the field even with seven adults working with four groups and six teachers and parents looking on. The following changes in the field protocols should be made to

increase the children's learning on how a Watershed works.

- Only one class with teacher at a time
- No more than 10 students per group
- One Instructor, one aid and one parent per group
- At least some of the Students should be supplied with boots
- Students should be asked to take field notes and recorded

In addition, booklets should be given to the students on the subject matter as a follow-up to classroom presentation and teachers should follow up in the classroom on what the students learned on the field trip(see follow up e-mail attached. The children should be encouraged to go home and teach their parents the dangers of pollution with the knowledge and materials they gained.

Appendix B – email received from Glen Rock teacher

Thank you all!! The letter from Kkristin Libretto, teacher of fourth grade at Byrd School says it so well.
It was a nEXCITING day and definitely a memorable one for all.
You participation made it so special and is appreciated more than you can know.
Thanks again and again.
carol.

----- Original Message -----

From: Libretto, Kristin

Sent: Thursday, May 20, 2004 6:25 PM

To: 'Muddygloves@hotmail.com'

Subject: THANK YOU!!!!

Dear Carol,

Thank you so much for yesterday! The students were still brimming over with enthusiasm this morning, when we sat and talked about all the things we observed and learned yesterday. This kind of first hand knowledge just can't be beat -- I know that long after they are grown, they will remember that damp afternoon in May when they petted a bullfrog, saw a bluegill guarding its nest, found a crayfish not much more than an inch long, found out that nature had a way of soothing that awful poison ivy itch, why skunk cabbage and shadbush got their names, and other similar memories.

They are making their own thank-you's but I couldn't let today end without conveying my own. I hope you'll let Dr. Pardi know that we are grateful, too, to him and his associates for teaching us about gauging the health of the water in this kind of habitat.

Glen Rock is certainly fortunate to have such a jewel as the Arboretum, but I know that without the efforts of you and your compatriots, it would not be the very special place it is today. You are indeed priceless. How can we ever thank you?

Sincerely,
Kristin LiBretto