NARRATIVE STATEMENT/WORK PLAN

THE ROWAN UNIVERSITY COMMUNITY PARTNERSHIP: BRIDGING ENVIRONMENTAL INFORMATION TO THE LOCAL COMMUNITY

Abstract

In spite of progress to empower communities with information about their environment, a gap between the growing base of environmental knowledge and the incorporation of that knowledge at the local level to guide environmental decisions and land management policy persist. Much of the disconnect between knowledge and policy can be attributed to ever-growing complexity of science, economic pressures for development and the challenge for local stake-holders to understand, incorporate and use environmental knowledge when making policy, managing land use or developing economic strategies. While environmental research should continue at a progressive pace, there is a vital need for developing better methods of making environmental knowledge more accessible and understandable to local stakeholders. To meet this need Rowan University has assembled demonstration and outreach projects on Watershed Evaluation and Education.

This proposal draws on two projects focusing on nonpoint source pollution (NPS) in New Jersey Watershed Management Area (WMA) 18. Both of the selected projects are in close proximity to the main Glassboro and satellite Camden campuses of Rowan University. The first project is located in the highly urbanized Waterfront South area in the City of Camden, and will center on working with the City of Camden to identify potential nonpoint pollution sources around Newton Creek and develop a community outreach program for community residents. The outreach activities will include faculty and student presentations on nonpoint source pollution, their impact on human health and the environment, and prevention options. Contamination of soil and groundwater via nonpoint source pollution will be demonstrated using simple visual experiments for a non-technical audience. The second project is in the municipalities of Glassboro, Pitman and Mantua Township, and focuses on the Chestnut Branch of Mantua Creek. This creek is of environmental importance because it is the headwaters for Alcyon Lake, and flows adjacent to the nearby Lipari Landfill. At one time, the Lipari Landfill was among the most contaminated sites on the EPA Superfund cleanup list. Successful remediation of the site and surrounding area has improved environmental quality, but problems such as nonpoint source pollution and litter still exist throughout the watershed. This project seeks to improve water quality in the Chestnut Branch watershed through collaborative partnerships between Rowan University, municipalities on the stream, and local K-12 schools.

Finally, to create a bridge between environmental professionals and the local community, a packaging of the environmental information in an easy to understand and visually engaging medium for both locations will serve to equip the local residents with an interactive means to access information after the project. Digital multimedia technologies such as digital imaging, digital video and virtual reality coupled with the wealth of digital environmental information now available for Geographic Information Systems (GIS) provides great potential for making the environmental information more accessible and understandable to local decision makers, non-governmental organizations, land developers, educators and citizens. This innovative program for community outreach utilizes newly available multimedia technologies for a more effective dissemination of environmental information among government entities, schools and community groups. The deliverables will include community workshops, school (K-12) workshops and an interactive CD-ROM for local government planners, environmental specialists, developers, and citizens. Such information is powerful in the decision making process and will serve as an asset to the City of Camden and the Boroughs of Glassboro and Pitman.

To accomplish these tasks and link them together with a geospatial component, we have assembled a multidisciplinary team including civil and environmental engineers and social science professionals with experience in environmental science, geospatial technologies and community outreach activities.

Introduction

There is a vital need for developing better methods of making environmental knowledge more accessible and understandable to local stakeholders. To meet this need Rowan University has assembled two demonstration and outreach projects on Watershed Evaluation and Education.

The two projects focus on nonpoint source pollution (NPS) in New Jersey Watershed Management Area (WMA) 18. This Lower Delaware River WMA encompasses 11 watersheds, as shown in Figure 1. Both of the selected projects are in close proximity to the main Glassboro and satellite Camden campuses of Rowan University. The first project is located in the highly urbanized Waterfront South area in the City of Camden, and will center on working with the City of Camden to identify potential nonpoint pollution sources around Newton Creek and develop a community outreach program for community residents. The second project is in the Boroughs of Glassboro and Pitman and Mantua Township, and focuses on the Chestnut Branch of Mantua Creek. This creek is of environmental importance because it is the headwaters for Alcyon Lake, and flows adjacent to the nearby Lipari Landfill. At one time, the Lipari Landfill was among the most contaminated sites on the EPA Superfund cleanup list. Successful remediation of the site and surrounding area has improved environmental quality, but problems such as nonpoint source pollution and litter still exist throughout the watershed.

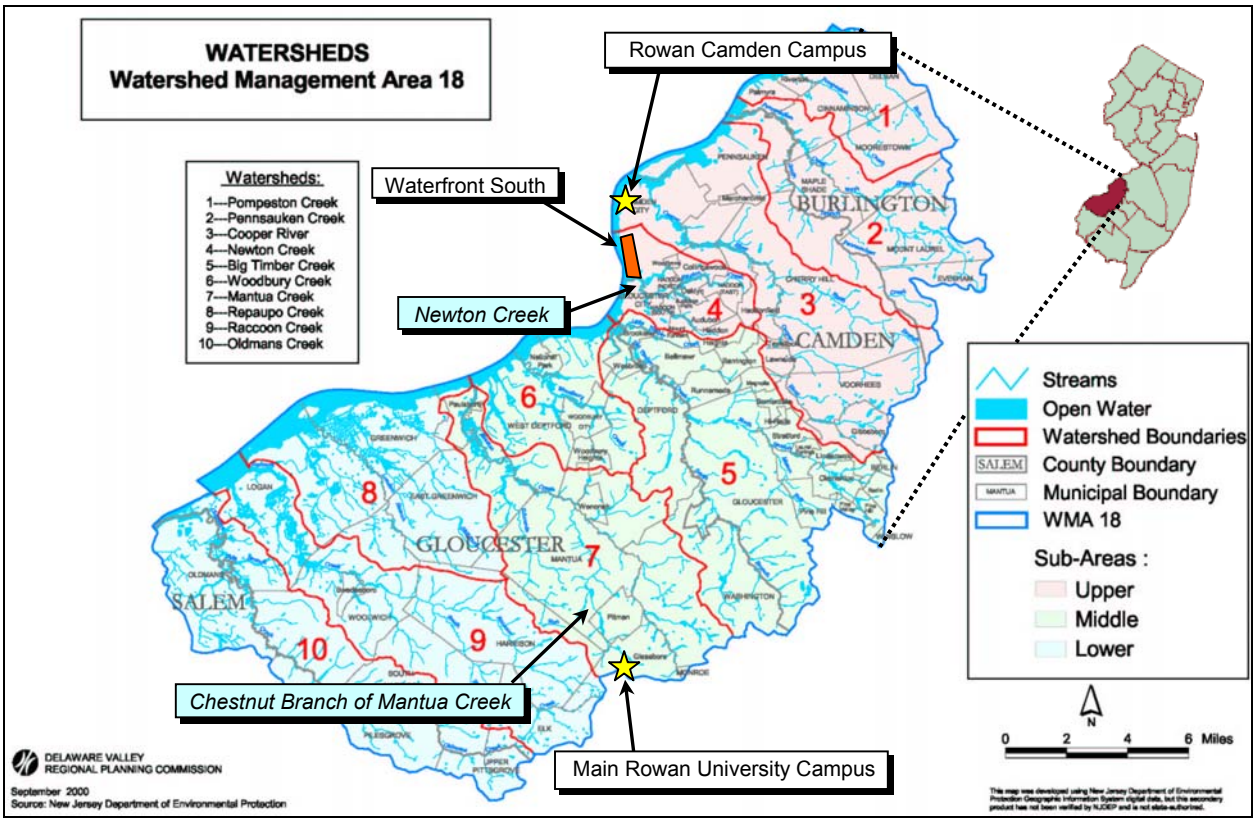

Figure 1: Locations of Project Areas (map courtesy of Delaware Valley Regional Planning Commission).

Both of these projects seek to improve environmental awareness and environmental conditions in the affected watersheds through collaborative partnerships between Rowan University, municipalities, local K-12 schools, and other local stakeholders. These objectives will be achieved through a combination of basic research, educational outreach and demonstration models, and dedicated university faculty, K-12 teachers, and students.

Why Rowan University?

Rowan University is a regional public university committed to teaching and public service. Through its institutes and its Camden campus, Rowan is able to extend the resources of its six colleges (Business, Education, Engineering, Fine & Performing Arts, Liberal Arts & Sciences and Communications) and the Graduate School to meet the needs of the residents of Camden.

The University formed the Liberal Arts and Sciences Institute (LAS) in 1993 to address the complex issues regarding the civic, economic and social foundations of communities in the region. Housed within the Liberal Arts and Sciences Institute is the federally funded, HUD Community Outreach Partnership Center (COPC); the COPC, among several other initiatives, affords Rowan University a unique leadership role by establishing partnerships among government, education, business, civic and community organizations and their leaders. Our goal is to serve as a catalyst for civic empowerment that works to address the wide range of challenges facing communities today. The activities of this proposal include outreach that stem from a long history of well-established partnerships among researchers, local governments, and civic groups. These partnerships recognize and respond to local concerns identified by communities within a broader regional context.

The College of Engineering at Rowan University was initiated as a result of a $100 million donation in 1992 from the Rowan Foundation. The engineering faculty use innovative methods of teaching and learning to better prepare students for entry into a rapidly changing and highly competitive marketplace. Key program features include: (a) creating inter- and multi-disciplinary experiences through collaborative laboratories and coursework; (b) stressing total quality management (TQM) as the necessary framework for solving complex problems; (c) incorporating state-of-the-art technologies throughout the curricula; (d) and creating continuous opportunities for technical writing and communication. To best meet these objectives, the four engineering programs of Chemical, Civil, Electrical, and Mechanical Engineering have common engineering clinic classes throughout their programs of study, in which undergraduates work in teams on hands-on open-ended projects.

The freshman clinic focuses on foundation principles, measurements, and competitive assessment. The sophomore clinic focuses on design taught from the viewpoint of the four disciplines: chemical, civil, electrical & computer, and mechanical. The junior and senior clinics emphasize multidisciplinary design on projects of progressive complexity. The Junior Clinic is a project-based course. Students work on projects suggested by industry, government, non-profit, and community groups, and entrepreneur/faculty interests. During the fall, 1998 semester, a total of 26 multidisciplinary projects were run. A team of 3 juniors began a project under the guidance of Drs. Everett and Jahan to assist in outreach activities concerning the Knox Gelatin site, in North Camden, NJ. The Knox Gelatin site has had industrial activity since the 18th century, but is currently unused. Students at Rowan assisted in the development of outreach materials that were used to better inform local residents about the Brownfields site. Specifically, students and professors at Rowan developed and gave two different presentations to residents in North Camden and assisted other outreach specialists by creating presentation aids. Similarly, water quality concerns near the headwaters of Chestnut Branch are currently being addressed through a streambank stabilization clinic project on the Rowan University Campus. *Therefore the College already has a history of community outreach through the engineering clinic classes and the LAS Institute.*

NPS Outreach with Waterfront South, Camden, New Jersey

Overview:

Camden (population 87,500) is the fifth largest city in New Jersey, and an economically distressed area. The city has a predominantly minority population, a high unemployment rate, and a one in three poverty rate. Manufacturing and related land use account for one third of Camden's nine square miles, and Brownfields constitute more than half of all industrial sites in the city. Abandoned industrial sites contain chemicals, transformers, and other contaminants that pose significant threats to human health. There is potential contamination of soil and groundwater. A lack of information about site conditions and potential liabilities at abandoned facilities have inhibited reinvestment, resulting in a decreased tax base, increased blight, decreased community morale and diminished employment opportunities.

Camden stands on the banks of the Delaware River opposite Philadelphia, surrounded by a number of southern New Jersey edge cities and affluent suburban enclaves. Along with industrial/economic decline, loss of its tax-base and difficult social problems, Camden has had a number of false starts at revitalization that have not led to any substantial change. Camden is a case study of present conditions and possible opportunities facing mid- and small-sized, post-industrial cities that have witnessed decline over the past few decades.

Waterfront South is a predominantly working class neighborhood, a patchwork of African-American, Hispanic, Vietnamese and older white residents, along Camden's southwest waterfront. Waterfront South is bounded by Atlantic Avenue on the north, Newton Creek on the south, Interstate 676 on the east and Delaware River on the west. Area housing was primarily built for industrial workers, and is mostly row and semi-detached, two-story with flat roofs. Most homes are clustered around industries that employ(ed) neighborhood residents, including McAndrews and Forbes, Colonial Processing, Quality Foods, Linden Worsted Mills, American Brake Company and Del Monte Tropical Fruit Company, in addition to South Jersey Port Corporation—Broadway Terminal, Camden County Municipal Utilities Authority's Sewerage Treatment Plant, and Ogden Technical Co-generation plant. Over the past 20 years, Waterfront South (U.S. Census Tract #6018) has lost nearly half of its population, including almost all of its whites, half of its males, more than a third of its females, and 47% of its families from 1970-1990. Waterfront South therefore is a predominantly (62.5%) black community, complemented by Hispanics (28%). It is largely populated with children; those under age 18 account for more than 40% of residents.

The private sector remains the major employer for area residents, with government second. Unemployment has increased drastically in Waterfront South, and is currently four times the rate in 1970. Although 30% of the males are jobless, female unemployment (8%) is well below the city's 13%. At $18,333, Waterfront South continues to lag behind Camden and South Camden in average household incomes. Area blacks average $21,446, followed by a nearly $7,000 gap for Whites and Hispanics. Over half of the area residents are poor and nearly a third receive public assistance.

Relevance to Needs:

All socioeconomic and physical data and recorded concerns on Waterfront South indicate a neighborhood with strengths and potentials as well as particular needs. Large numbers of youth, single parent families and elderly receive inadequate health care, recreation and social services. Many land uses are incompatible in design, and poorly supported by an infrastructure of lights, sewers, roads, and sidewalks. While Waterfront South may offer many development opportunities and strong investment potential with regards to location advantage, vacant land, housing stock and a strong community; the major deterrent to revitalization is the widespread environmental pollution of the area's land, buildings and water. Widespread environmental pollution threatens the health of the residents and workers, inhibits property investments and adds to the cost of redevelopment through the necessity of clean-up activity.

Currently the NJDEP Site Remediation Program web page records indicate that there are 126 listed hazardous waste sites out of which 80 are designated active in the City of Camden. None of the sites at Waterfront South have been adopted under the Brownfields initiative yet. Three Brownfield sites - the Knox Gelatin Site, Conrail Trestle Site and a former Barrel Recycling Site - have been identified in the North Camden region.

The Waterfront South overview presented earlier clearly indicates that this part of Camden is in dire need of community outreach with respect to environmental pollution issues in general. This proposal therefore presents a plan for community outreach for Waterfront South focusing on nonpoint source pollution outreach.

There are three waterways in the Camden area: the Delaware River, Cooper River, and Newton Creek (Figure 1). Needless to say, these rivers and streams are severely impaired. The water quality problems are a result of municipal and industrial discharge, combined with the effects of both agricultural and urban storm water run off. Decreased water quality results primarily from nonpoint source pollution - *the pollution arising from a wide number of locations and causes, including contaminated stormwater runoff from paved surfaces, lawns, and farm fields*. Forms of non-point source pollution such as pesticides from lawns and oil from streets and parking lots drain into lakes, rivers, and streams, during rainfall events. It is not often realized that these non-point source pollutants pose a huge threat to the health of our waterways. In fact, the NJDEP has issued an advisory stating that all fish, shellfish, and crustaceans taken from Camden waters not be eaten due to chlordane contamination. Chlordane, a chemical found in pesticides, is known to damage the liver and central nervous system. This is the strictest warning of its kind in the state. Area waters are also under advisory for industry related toxins: dioxin, PCBs, and mercury. All of these chemicals have detrimental health effects.

Major public education, neighborhood revitalization and pollution prevention programs have been developed for the Cooper and Delaware Rivers in Camden. However efforts are still in their infancy for Newton Creek. Newton Creek is the smallest of the streams in the Camden/Gloucester County and runs primarily through heavy suburban/urban development with heavy industrial areas in South Camden near its confluence with the Delaware River. The creek is 4 miles in length and is classified as an FW-2 Nontrout freshwater body. As a result of the heavy urban development, the creek is prone to flooding which contributes to elevated levels of fecal coliforms. Levels up to 285,000 col/100ml were recently measured indicating contamination from human sources.

Approach:

The work proposed here will use students in the Rowan University junior and senior engineering clinics to identify nonpoint source pollutants in the Newton Creek watershed in Camden and develop and implement appropriate outreach activities. A multidisciplinary team of three engineering students and two Liberal Arts and Sciences Institute interns will be formed. A graduate student and the Principal Investigators will further supervise this team. The tasks for this team will be subdivided into watershed characterization and information dissemination for community outreach.

Watershed Characterization

The current state of the Newton Creek watershed will be assessed through both qualitative and quantitative means. Geomorphologic features of the urbanized riparian corridor will be documented, and stormwater facilities will be cataloged.

Physical conditions of the stream and tributaries will be documented using a standardized stream assessment protocol. The stream assessment will identify areas with stream bank erosion, headcutting, and bed degradation. In addition, the adjacent riparian areas will be documented, including vegetative canopy, land use, and presence or absence of buffer zones adjacent to the stream corridor. During the stream assessments, investigators will identify potential sources of NPS and trash.

Locations of existing stormwater facilities will be documented and mapped in the GIS system. This will include stormwater outfall locations in or adjacent to the stream corridor, as well as detention/retention basins, storm sewer inlets, and other conveyances. Riparian fieldwork will be done in the late fall and winter months, when streamside vegetation is at a minimum.

Community Outreach

This team of students will be responsible for developing a plan of action for educating the Waterfront South community on the environmental pollution issues plaguing their localities with special attention to nonpoint source pollution. Faculty will coordinate outreach activities with the City of Camden Redevelopment Agency, Camden City Industrial Development Corp., Heart of Camden, Inc., South Camden Citizens in Action and the Camden Development Collaborative. Education will include focus meetings on specific topics as relevant to nonpoint source pollution in the Waterfront South area. Topics will also include the role of Superfund and Brownfields sites and their impact on surface and groundwater pollution.

Students and professors will hold key meetings with various audiences such as:

- A multi-topic community-wide meeting with a short presentation on nonpoint source pollution as relevant to watershed management in general and specific to Waterfront South;
- Two, four-hour workshops for citizens residing in the vicinity of potential contaminated sites contributing adverse pollutants to the Newton Creek watershed; and
- Classroom projects held in local schools (elementary, middle and high school).

These projects will have hands-on demonstrations along with interactive presentations to describe general nonpoint source issues.

The outreach efforts will cover several topics that will vary based upon the audience. Hands on demonstrations illustrating the fate, transport and remediation of contaminants in the environment will be an integral part of this project. Students will allocate time in developing simple demonstration modules for their target audiences.

Hands-on demonstrations will be conducted to educate the public on the fate and transport of contaminants in the environment. Demonstrations on common remedial technology will also be performed. Colored compounds and dyes will be used in these demonstrations so that workshop participants can easily understand the complexities in soil and groundwater contamination. Three such demonstrations are described below.

Nonpoint Source Pollution Demonstration Model

The Nonpoint Source Landscape Model (Figure 2) is a visual tool that allows educators to demonstrate pollution pathways from nonpoint sources, including residential areas, forestry, transportation, recreation, agriculture and construction, as well as from industry and point sources. Pollution and runoff are visually apparent when rain falling over the landscape top carries soil (represented by cocoa powder), chemicals (colored drink mixes) and oil (cocoa and water mixture) through a watershed to a body of water. The unit can further be used to demonstrate Best Management Practices (BMPs) that include felt buffer strips as vegetation, clay to create berms and other methods to show conservation and water pollution prevention measures at work. The unit offers a visual demonstration of nonpoint source pollution and the steps everyone can take to help prevent environmental contamination. It is also an excellent tool for presenting overall watershed concepts.

Figure 2: Nonpoint Source Pollution Model by Enviroscape.

Groundwater Contamination Simulator

A groundwater simulator shown in Figure 3 will be used to demonstrate groundwater and soil contamination. This simulator has a geologic cross section with three principal sand and gravel aquifers and one aquitard. This model includes wells, streams, lakes, underground storage tanks and septic tanks. The simulator lends itself to many possible combinations of dye (which represents a contaminant) injection and pumping wells to illustrate various ways soil and groundwater may become contaminated. It will aid the general audience in relating to contamination of soil and groundwater and actually involve them in using the model for various contamination scenarios.

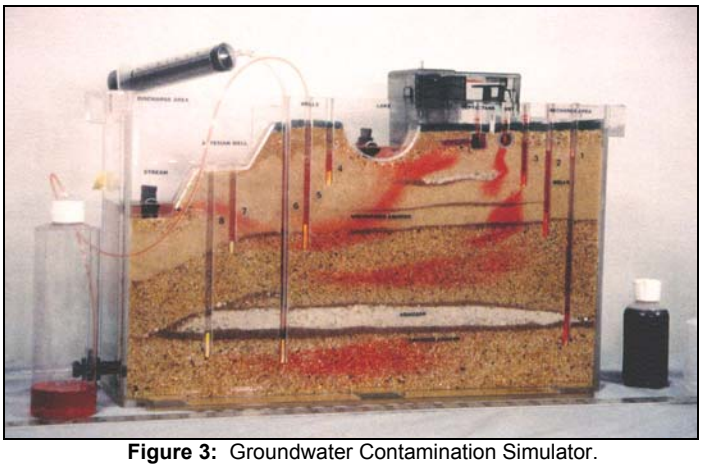

Figure 3: Groundwater Contamination Simulator.

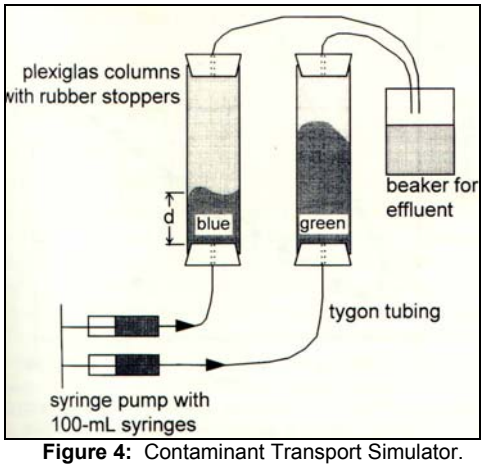

Figure 4: Contaminant Transport Simulator.

Contaminant Transport in Porous Media

The transport of contaminants in sand will be illustrated using two colored solutions (green and blue). The two dyes have different solubility in water and will be pumped through glass columns packed with sand (Figure 4). Because of their differences in affinity for water one of the compounds (blue dye) will move slower as compared to the other. This simple experiment allows visual assessment of migration of contaminants and is an excellent demonstration of why certain compounds move faster than others, in the subsurface.

Common remedial techniques for removal of organics in water with activated carbon, air stripping using packed bed towers and biodegradation of contaminants can also be demonstrated by developing simple demonstration models by the student team. Engineering students will be responsible for developing these demonstration modules and help with demonstrations during outreach activities. Liberal Arts and Sciences personnel will focus on the community needs, zoning and land use information, and demographics.

Expected Results/Deliverables:

Environmental issues are interdisciplinary by their very nature. Issues involve scientific principles, government legislation and regulation, community relations, technology, city planning, and communication. This project therefore is an excellent opportunity for students to explore the relationship between science and technology and community outreach. Students will also be exposed to multi-cultural issues and race relations. Issues surrounding environmental justice, the focus of federal attention on the environmental and health conditions in minority and low-income communities will be investigated because of the disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Students working on this project will be able to:

- Explore the impact of prejudice and racism on the level of community exposure to environmental hazards and any subsequent remediation;
- Explore and evaluate related multi-cultural issues, race relations, and their perceptions of these issues;
- Assess and compare the risks involved from exposure to environmental hazards related to the community in which one resides (urban and suburban);
- Interact and collaborate with students and teachers from other disciplines;
- Apply an interdisciplinary approach to studying problems and seeking solutions;
- Interact with business, government, scientific, and community leaders in the process of investigating and solving an environmental issue and the impact it has on a community (urban and suburban);
- Examine the interworkings of local, county, state and federal government; and
- Increase public awareness of an environmental issue by the dissemination of information through interactive presentations and demonstrations.

The findings from the outreach activities will be a significant contribution not only for the communities of Waterfront South but also for other similar cities all over the USA. The presentations will help in making communities relate to environmental pollution problems, their health impacts and the complex remedial process. The hands-on demonstrations will be a significant contribution in explaining the complexities of water pollution to the communities.

This proposal provides college students valuable experience to learn about the multidisciplinary nature of such projects and will also help them build their academic and leadership skills, raising educational expectations and instilling self-confidence.

The results of the outreach activities outlined in this proposal will be presented at local and national conferences. The American Waste Management Association, American Society of Civil Engineers, Water Environmental Federation are all focusing on pollution initiatives and case studies.

Suburban Watershed Evaluation and Education Demonstration

Overview

Chestnut Branch is a tributary stream of Mantua Creek, in Gloucester County, New Jersey. The stream originates in the borough of Glassboro, and flows through the main campus of Rowan University. After exiting the campus, Chestnut Branch flows through the communities of Glassboro, Pitman, and Mantua Township, before joining the main stem of Mantua Creek. The Hydrologic Unit Code (HUC) for the upper reaches of Chestnut Branch is 0204020213030. The location of the stream is shown in Figure 1.

The Chestnut Branch of Mantua Creek is of environmental importance because it is the headwaters for Alcyon Lake in Pitman, New Jersey, and flows adjacent to the nearby Lipari Landfill. At one time, the Lipari Landfill was among the most contaminated sites on the EPA Superfund cleanup list. Successful remediation of the site and surrounding area has improved environmental quality, but problems such as nonpoint source pollution (NPS) still exist in the watershed.

This project seeks to improve water quality in the Chestnut Branch watershed through collaborative partnerships between Rowan University, municipalities on the stream, and local K-12 schools. Because Glassboro and Pitman are challenged by a number of environmental issues typically found in suburban communities such as non-point source pollution of the local streams, potential flooding related to land use, problems associated to traffic congestion and other problems typically encountered by maturing towns throughout New Jersey, this demonstration project is needed to advance environmental outreach activities. In addition to addressing the contamination of Alcyon Lake from the adjacent Lipari Landfill, the communities are further challenged to deal with suburban sprawl by managing the remaining open space within the watershed and adequately addressing the continued pressures of development for the remaining vacant tracts of land. Access to current environmental information through the development of the multimedia environmental resource CD will greatly benefit decision-making and environmental education in the towns of Glassboro and Pitman.

Relevance to Needs

Land use in the Chestnut Branch watershed is a mix of agricultural and suburban development. In Glassboro, the headwaters of the stream are located in a fully developed area. In the middle and lower reaches of the stream, extensive suburban development has occurred (mainly on the eastern side of the stream), and active farmland is under development pressure. The area upstream of Alcyon Lake is in the Metropolitan (PA1) and Suburban (PA2) planning areas, according to the New Jersey State Plan. The lower reaches of the watershed also include portions that are designated Fringe (PA3) and Rural (PA4) planning areas.

The now-closed Lipari landfill was once the source of water and sediment contamination in Chestnut Branch and Alcyon Lake. A multi-million dollar cleanup effort was undertaken at the site and surrounding areas. The remedial efforts at the landfill site included installation of an on-site containment system, batch flushing of contaminated leachate, and dual phase extraction of volatile organic compounds. Contaminated sediments in Chestnut Branch and Lake Alcyon were dredged and remediated, and a showcase municipal park was created along the lake's shores. The cleanup efforts included regular monitoring of water quality in Chestnut Branch and Alcyon Lake. However, regular monitoring has stopped, due to completion of the remediation project.

The New Jersey Department of Environmental Protection conducts ambient biological measurements throughout the State on a regular cycle, with repeat measurements in streams every four or five years. These measurements have been established as an Ambient Biomonitoring Network (AMNET), and are intended to show long-term trends in water quality and aquatic ecosystem health in specific watersheds.

The most recent sampling in Chestnut Branch was conducted in 1996 and 2000. Both of these sampling events indicated "moderate" impairment of the aquatic ecosystem in Chestnut Branch.

Water quality concerns near the headwaters of Chestnut Branch are currently being addressed through a streambank stabilization project on the main Rowan University Campus. This project, funded by the New Jersey Department of Environmental Protection (NJDEP), is a cooperative agreement between the University, the Gloucester County Planning Division, and other related government entities. This project is limited in scope solely to assessment and restoration of the 0.75-mile segment of the stream that passes through the Rowan campus. The project is focusing on design and installation of bioengineering measures to reduce streambank erosion and downstream sediment transport, and routine water quality monitoring on campus

In addition to chemical contamination concerns and sediment accumulation in Alcyon Lake due to streambank erosion, the Borough of Pitman has been confronted with an abundance of trash in the upper reaches of Lake Alcyon. This litter is brought to the lake via Chestnut Branch, and has become a nuisance and maintenance issue for the municipality.

A large parcel of agricultural land in the middle reach of the Chestnut Branch has recently been acquired by Rowan University. Although the site is currently used as peach orchards, the University expects to construct athletic facilities and a South Jersey Technology Center on the properties over the next few years. The development of these areas will certainly affect stormwater quantity and quality.

All of these issues together indicate that Chestnut Branch is a watershed that is in danger of deteriorating further if active measures are not taken to address water quality and ecological habitat concerns. In addition to engineering solutions to these problems (for example, installation and adaptation of stormwater Best Management Practices), there is a need to raise the awareness level of municipal officials with regards to watershed issues, especially since EPA Phase II Stormwater Regulations will soon be implemented in New Jersey.

Approach

The overall goals of this project are to foster collaborations between Rowan University and surrounding communities, and to lay the foundations for long-term improvements in environmental quality. This facet of the project is focused on improving water quality in the Chestnut Branch watershed by identifying sources of NPS pollution. This will aid in development of regional Stormwater Management Plans.

The Watershed Evaluation and Education Demonstration Initiative will achieve its goals via:

- Identification of current watershed conditions;
- Assessment of current water quality; and
- Outreach and Dissemination of information.

These tasks will be accomplished through a combination of student-centered activities at the college level (via the Engineering Clinic program); elementary, middle, and high-school activities led by K-12 teachers; and workshops.

Watershed Characterization

The current state of the Chestnut Branch watershed will be assessed using techniques similar to those used for the Newton Creek watershed. Geomorphologic features of the riparian corridor will be documented, and stormwater facilities will be cataloged.

Physical conditions of the stream and tributaries will be documented using a standardized stream assessment protocol. The stream assessment will identify areas with stream bank erosion, headcutting, and bed degradation. In addition, the adjacent riparian areas will be documented, including vegetative canopy, land use, and presence or absence of buffer zones adjacent to the stream corridor. During the stream assessments, investigators will identify potential sources of NPS and trash.

Locations of existing stormwater facilities will be documented and mapped in the GIS system. This will include stormwater outfall locations in or adjacent to the stream corridor, as well as detention/retention basins, storm sewer inlets, and other conveyances.

Engineering juniors and seniors will conduct all of these activities, as part of the upper-level engineering clinic program. Students will work in teams under the supervision of a graduate student and the Principal Investigators. Riparian fieldwork will be done in the late fall and winter months, when streamside vegetation is at a minimum.

Water Quality Assessment

Water quality in Chestnut Branch, Alcyon Lake, and several tributary streams will be monitored on a regular basis. Several parameters will be measured in the field, such as temperature, dissolved oxygen, conductivity, and pH. In addition, samples will also be collected for later laboratory analysis of turbidity, total suspended solids, and organic compounds. These measurements will complement prior studies monitoring water quality downstream from the Lipari landfill.

Engineering juniors and seniors will take quantitative water quality measurements, as part of the upper-level engineering clinics. Students will work in teams under the supervision of a graduate student and the Principal Investigators.

In addition, K-12 instructors will teach elementary, middle, and high school students how to conduct basic water quality measurements and stream assessments, to provide education about watershed issues and stream and lake water quality at a number of levels.

Expected Results/Deliverables

A major component of the proposed work is outreach to a number of populations, including:

- The general population of the involved communities;
- Persons living near Chestnut Branch and Lake Alcyon;
- Elementary, middle and high school students; and
- Municipal politicians, commission members (e.g., environmental and planning commissions) and public works employees.

Outreach will be both broadly distributed and targeted. Broadly distributed outreach will consist of a multimedia CD and website. Targeted outreach will include workshops with interested community members, classroom projects with school populations, and workshops for municipality politicians, commission members and public works employees.

Workshops for interested community members will be both informative and feedback oriented. The results of stream and lake assessments will be described and practical suggestions for improving stream and lake quality provided. Feedback from the general population will be obtained and communicated to the appropriate municipal officials. These workshops will involve community members interested in the aquatic environment of their community.

Classroom projects will include one class in each of the municipalities (Glassboro, Mantua, and Pitman). The Glassboro High School and Jay Mason Tomlin Elementary School in Mantua Township both border Chestnut Branch and, thus, are prime targets for participation. In Pitman, projects will be conducted with the six-grade science teacher. Class projects will involve students directly in assessing the quality of the Chestnut Branch and Lake Alcyon. Their efforts will be used the CD and Website, as well as in workshops. Classroom projects will introduce students to scientific and engineering concepts and work and give them an opportunity to create written and visual works that will be published.

Workshops with municipal personnel will be used to report on the quality of Chestnut Branch and Lake Alcyon, present practical solutions to any problems documented by the assessments, disseminate best management practices for maintaining the quality of the stream and lake, and assist in related community planning.

The project deliverables include a CD and website, reports, and workshops. The CD and website will have educational and planning benefits.

Interested community members and teachers will use the CD to educate themselves and others about Chestnut Branch and Lake Alcyon. Much of the material will be generated by the Rowan professors and students working on the project; however, K-12 students participating in class projects will contribute material to the CD and website.

Reports will be used to document stream and lake quality and problem, describe solutions to observed problems, and describe best management practices. Workshops will be used to disseminate results and encourage appropriate planning and practices.

Interactive CD-ROM Work plan

The two study areas represent vastly different social, economic and environmental conditions and will provide insight on the usability, practicality and success of the multimedia demonstration project for municipalities at different ends of the municipal spectrum.

Pitman is challenged by a number of environmental issues typically found in suburban communities such as non-point source pollution of the local streams, potential flooding related to land use, problems associated to traffic congestion and other problems typically encountered by maturing towns throughout New Jersey. Pitman has also had to address the contamination of Alcyon Lake from the adjacent Lipari Landfill, one of the nations more significant Superfund clean-up sites. Pitman is challenged to deal with suburban sprawl by managing the remaining open space within the municipality and adequately addressing the continued pressures of development for the remaining vacant tracts of land. Access to current environmental information through the development of the multimedia environmental resource CD will greatly benefit decision-making and environmental education in the town of Pitman.

Camden City is faced with a completely different set of problems and circumstances. As one of the poorest cities in the nation, Camden is challenged to maintain a viable economy, attract vitally needed development, provide public services and hold its population from suburban flight. Brownfield sites provide substantial possibilities for urban redevelopment and the economic benefit that would it would bring. Camden also benefits from an ideal geographic location with a major port on the Delaware River located adjacent to Philadelphia, the fifth largest city in the nation. Nevertheless, Camden is also imperiled by substantial challenges thwarting redevelopment attributable to environmental contamination, an inadequately educated workforce, quality of place issues that fuel inner city flight such as high crime rates and endemic poverty. For Camden to have a chance of revitalization, it needs to have environmental and socio-demographic information easily accessible to planners, educators and potential developers.

Scope of CD-Rom Creation

The development of multimedia environmental resource CD ROMs for Pitman Borough and Camden City by the project team will be carried out for both communities. The custom packages will have a user-friendly interface that will include the five principle areas of the disc (the maps section, digital library, photo gallery, science/ecology & environmental stewardship information, and documentation:

- A GIS viewer with all publicly available geospatial data custom packaged for each municipality. (this data will include geographical, socioeconomic, population, land use data, etc…
- The Digital library section containing the most significant state/local/national reports, manual and documents will inform the consumer. Also included in this section will be links to other resources and tips regarding how to access the information.
- Photo gallery, panoramic VR of key locations within the municipality and digital video clips.
- Biodiversification (science/ecology) and environmental stewardship: this section is not only for r use in community outreach and wetlands education by the general public, but in school science classes.
- Documentation composed by the research team in layman's language in how to understand the environmental information and interpret the data provided on the disk. The documentation will be user-friendly with hot links to the GIS data viewer, the digital library, photo gallery and video clips.

Conclusion

This proposal with its two demonstration sites, seeks to fill a vital need in the New Jersey Watershed Management Area 18. Moreover, the importance to the development of regional sustainable development practices and the ongoing development of city, state, and regional collaborations is highlighted by the alliances we have formed with the local government and communities. .Nonpoint pollution poses a threat not only to natural resources but also how communities manage and plan for these threats to the general environment and health/safety of its citizens. Working in conjunction with the leadership of our demonstration communities will assist in bridging the gap among communities and coordinate efforts in the most efficient manner to disseminate information that ultimately empowers citizens. Such a comprehensive demonstration project with an educational outreach campaign would not only be insightful but also ignite an interest in continued promotion of pro-environrmtal attitudes. It is through the exploration and evaluation related multi-cultural issues, race relations, and their perceptions of these issues; understanding assess and compare the risks involved from exposure to environmental hazards related to the community in which one resides (urban and suburban); interacting and collaborating with students and teachers from other disciplines; the interaction with business, government, scientific, and community leaders in the process of investigating and solving an environmental issue and the impact it has on a community (urban and suburban). In essence the demonstration communities will have an increased public awareness of an environmental issue by the dissemination of information through interactive presentations and demonstrations. That will ultimately benefit municipal politicians, commission members (e.g., environmental and planning commissions), citizens, and institutional stakeholders. The key to this proposal is in its ability to serve an urban and suburban community with complex issues that are similar in nature. Such a multidisciplinary survey approach will provide unique research opportunities for current and future WMA 18 research and information dissemination.

Project Schedule, January 1, 2002 to December 31, 2002, Rowan University

Task	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Camden / Newton Creek												
Field Assessment / Watershed Characterization												
GIS database development												
Education & Outreach												
Public workshops, demonstrations												
K-12 activities												
Dissemination												
Multimedia CD												
Web site												
Conferences												
Chestnut Branch												
Field Assessment / Watershed Characterization												
GIS database development												
Education & Outreach												
Public workshops, demonstrations												
K-12 activities												
Workshops for professionals, politicians												
Dissemination												
Multimedia CD												
Web site												
Conferences												