New Jersey Flows

New Jersey Water Resources Research Institute

Volume II, Issue 3 **WINTER, 2001**

Conference Highlights from "Water For South Jersey: Will the Supply Meet the Demand?"

By Eric Evenson, NJ District Chief for the U. S. Geological Survey

I am happy to exchange thoughts and ideas with you about a topic that has long been taken for granted – the availability of freshwater in the New Jersey Coastal Plain. This meeting presents a great deal of information on the facts about water availability and usage, on programs that are designed to plan for water use and protect existing supplies. And you will hear about the many uses that depend on water availability; maintaining thriving biological communities, recreational uses, agricultural needs, public supply, and industrial uses. I do not intend to touch on these topics. My intent is to lay out a challenge for today's forum.

In New Jersey, nature provides us with about 45 inches of rainfall in an average year. Additionally, in most years, the precipitation falls uniformly throughout the seasons. Many other regions of our country would be envious of our meteorological and hydrologic conditions. Yet, here we are discussing whether the supply will meet the demands. The bottom line is, even though our resources are great, our demands are also great. So, where do we go from here?

I don't have answers to that question, but I do have considerations that we need to struggle with as we collectively attempt to provide an answer. And, I do mean **struggle**. We have some hard decisions to make and some paradigms to break if we are to accommodate economic development, while preserving our natural resources. Let me list a few of these.

In South Jersey, as in other parts of the coastal regions of the country, we have afforded ourselves the luxury of ***"once used"*** water. What that means is that we withdraw water from its source, use it once, and discharge it to the ocean or bays where it cannot be used again without desalination. We cannot afford to continue this practice into the future. We have always viewed used water as a waste. It is not. It is a commodity that can be cleaned and reused for many other purposes. We must not discard this commodity; we must look at how it can be beneficially used.

We have also instituted a paradigm that we should be able to develop our water supply directly under the location where we use it. Many of our municipalities have their own well fields in their own political boundaries and rely directly on that source for all of their supply. Through this fashion of water supply development, we have basically found and utilized all of the "cheap" water in the coastal plain. **From this point on, water is going to increase in cost**. If we were to consider cities such as Los Angles, San Francisco, and Denver, they would not exist if they had followed this same paradigm of water supply. Even closer to home, New York City, Newark, and Jersey City move water tens to hundreds of miles from its source to where the population requires the water. In the future, we will also have to

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The Director's Chair

by Joan G. Ehrenfeld, Ph.D., Director, New Jersey Water Resources Research Institute
Rutgers, The State University of New Jersey

We in New Jersey are blessed with abundant rainfall, which has traditionally led us to believe that there is and will always be enough for all the uses to which water is put. While this may have been the case in earlier times, the evidence is increasingly strong that this is no longer true. Conflicting demands and degradation of our water supplies from salt water intrusion and pollution have become major issues affecting all aspects of the economy, agriculture and the environment. This is especially true for South Jersey. The reliance on ground water, the susceptibility of the aquifers to over-pumping and to contamination, and the rapid economic growth in the recent past have combined to make water availability the key issue for the future of the region.

The NJWRRI was pleased to collaborate with the Southern New Jersey Development Council in developing an informational meeting about water in South Jersey. Our intention was to bring together the many stakeholders in the use of water, and to begin a process of re-thinking how water is used in the region. The conference, **"Water For South Jersey: Will The Supply Meet The Demand,"** which attracted nearly 200 people, was a great success. We now hope to build on this beginning to find solutions to the problem. Due to the interest generated in this topic, we chose to focus this newsletter issue on highlights from this meeting. *****

A Purveyor's Perspective

By Art Shearman, New Jersey-American Water, Burlington/Camden/Gloucester Manager

When I first read the phrase, *the availability of water is rapidly becoming the most limiting factor in managing land in southern New Jersey,* I became very unsettled, especially given my line of work.

It must be remembered, we get slightly more than 40 inches of rain each year in this part of the country. That's a million gallons per acre for every acre in South Jersey. That's a lot of water. Our average customer at NJ-American uses about 7,000 gallons a month. Even if you assume that average customer has a ¼ acre lot, and there are four of them per acre, they'll use less than half that supplied by rainfall.

Mother Nature provides a lot of rain, but then we humans parcel up the land and impose various arbitrary limitations on our ability to spread that water around. Sure, the amount of water on our planet is finite. There is no more or less than there was when the dinosaurs lived. But managed properly, there is plenty to go around, on average. To me the solution is pretty straightforward - ***our land and water use laws and practices have to more closely match natural laws***.

In the mid 80's, when no one else was interested in extending beyond their borders and developing other sources, NJ-American did by considering the Delaware River as a source and now we'd like to work together to move that water from where Mother Nature has placed it to where it is needed. By thinking regionally rather than parochially, I believe we'll find there is a lot more water available for us to use. Our overused aquifer is only one source of water available for the region but the Delaware River can provide us with enough water to support a considerable amount of growth. All we need to do is work together to deliver it to the appropriate location.

Human imposed boundaries conflict with Mother Nature's boundaries. Within the Critical Area there are conflicts occurring well by well. It's not being looked at from a regional perspective but instead a community's. Water purveyors and others are very protective of their turf, even if that turf is liquid and flows beneath their feet. ***I can tell you that from the water supply perspective, there is very little altruism.***

I can best demonstrate this by relaying a conversation I had recently. We were discussing transferring water and the thought was put forward that this particular community was only recently being developed and that they shouldn't be limited in where they could take their water from because others caused the problem years ago. I reminded him of the DEP's concept that all entities, old and new, contributed and continue to have the potential to contribute to the problem of over pumping the aquifer and that everyone should share in the solution. The response I received, "I don't care about the region, I only care about my town." ***I suggest that attitude, and not water, is our most limiting factor.*** *

Highlights

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move water longer distances from available supply to where we chose to use it.

Another practice that we have instituted is "shopping" for the cheapest cost river segment to discharge our once-used water. This practice leads us to deplete streams of baseflow by shipping the wastewater to a large river with lots of assimilative capacity. If we want to lessen stream depletion and maintain instream uses, we will have to treat wastewater to higher levels and reuse it.

Finally, we have designed systems that are very efficient at getting water from one source and to the point of use, but they are not very good at sharing or distributing water from many sources to where the water is needed. We will need to plan from a more regional perspective in the future and allow water to be shared from various sources. One example would be, during droughts, to utilize water mainly from confined aquifers and share the water among many users. This would reduce stress on the surficial systems, but would require water suppliers to work together to share the water supply sources.

We have to face the realization that all of the cheap and easily developed water in the coastal plain has been tapped. In the future, water will cost more, be harder to get at, and face greater competing uses. There will be greater environmental constraints to preserve biological communities and maintain health estuaries. We will have to transport water longer distances, and discharging the wastewater will be more costly. This will force us to look at our used water as a commodity, and the sooner that we face that, the better.

So my challenge to you is to ***struggle*** with these issues as we try to answer the question, ***"Will supply meet demand?"*** We still have alternatives in the water supply arena, but all will require higher costs, more commitment to sharing of sources, greater public acceptance, and harder work to implement. We have to break the paradigm of past water supply management and embrace these changes so that we may move forward. *

Drought Emergency declared 12/18/01

With reservoir storage & ground water supplies well below seasonable averages, **Delaware River Basin Commission (DRBC)** declared a **hydrologic drought emergency** in the 13,539 square-mile watershed which drains portions of New York, Pennsylvania, New Jersey, & Delaware on **Dec. 18, 2001 (see www.state.nj.us/drbc/).** New Jersey's Northwest, Southwest, and Coastal South Drought Regions remain on **"drought warning"** and the remainder of the state, the Northeast, Central, and Coastal North Regions, on **"drought watch"** as issued by NJDEP State Commissioner Bob Shinn on Nov. 21, 2001. **NJ drought site www.njdrought.org/Other drought info www.state.nj.us/dep/watersupply/**

Water Supply Planning and Watershed Management

By Robert Kecskes, Section Chief, Water Supply Planning, NJDEP Division Watershed Management

The history of water supply planning in New Jersey was discussed - from the early 1800's to today. Until relatively recently, weak or non-existent laws allowed for reservoir yields to be exceeded, saltwater intrusion to contaminate regional aquifers, and the proliferation of "unplanned" water supply diversions that resulted in water quality and ecosystem impairment. Adequate water supply planning laws were not enacted until the early 1980s. These laws will be enhanced by the watershed management initiative that the Department of Environmental Protection has recently undertaken.

The impetus for the first 1981 NJ Statewide Water Supply Plan, the Water Supply Management Act and NJ Water Supply Bond, was discussed. This first statewide plan was largely reactive, emphasizing the need to construct new water supply infrastructures and other initiatives that were capable of overcoming the problems discussed above. New reservoir systems and interconnections between reservoirs were made to eliminate surface water supply problems in the northern part of the state, and new water supply infrastructure was built in the southern half of the state to overcome ground water problems.

A description of the 1996 NJ Statewide Water Supply Plan was next provided. A major theme of this plan was to better manage existing water supplies through the development of watershed management plans that integrate water supply, wastewater, and land use planning.

The second half of the presentation focused on the next NJ Statewide Water Supply Plan, which is scheduled to begin in 2002. The issues that need to be addressed in this plan include water conservation, water reclamation, drought management, environmental indicators that limit consumptive water uses, the need for a water supply plan for each watershed, integration of water supply planning and watershed management, and needed legal changes.

A primary strategy of the next plan will be for water demand to remain within the assimilative (carrying) capacity of the water resources within the affected watersheds. This strategy will need to define this capacity, and to ensure that water supply withdrawals are placed in optimal locations and that the withdrawal rates do not exceed this capacity. Watershed stakeholder involvement will be needed for this strategy to be successful.

Where applicable, the presentation discussed the implications to southern New Jersey water supplies. *****

Water For Natural Resources

By Joan G. Ehrenfeld, Director, New Jersey Water Resources Research Institute, Cook College, Rutgers University

Aquatic ecosystems are a critical part of the south Jersey landscape. Streams, lakes, rivers and wetlands are found everywhere, supplying a wide variety of resources to the people of the region. All aquatic ecosystems are critically dependent on the water flow regime, not just on whether water is present or not. By "water flow regime" ecologists refer to questions of how much water, when, how frequently, how fast, how long a combination of depth and flow rate lasts, and how predictable from year to year are these characteristics. These aspects of water supply determine the physical environment of the habitat, they support different communities of organisms, and they regulate the degree to which the ecological functions of value to society are expressed. Moreover, these aspects of aquatic ecology are linked to each other; the water quality, the organisms, and the physical aspects of the environment set by a given water flow regime affect each other. This set of complex interactions, set by the water flow regime, determines the ecological integrity of a site. Small changes in flow regime can cause large changes in biotic communities, resulting in changes in species, communities, and ecological functions. Ecological functions that depend on flow regimes include the removal of excess nutrients and other water pollutants, the storage of flood waters, streambank protection, the retention of sediments, the recharge of groundwater, support of wildlife (birds, fish, mammals, reptiles) and biodiversity in general, and recreation. An example of this dependence is the removal of excess nitrates from groundwater, which recent USGS studies have shown to be a major problem in the Kirkwood-Cohansey aquifer. A small change in water level, or a decrease in the amount of time that riparian soils are wet, will result in a switch from removal of nitrates by sediment microbes to the transmission of nitrates to downstream surface waters. Similarly, altered flow regimes affect the physical environment and the biota of aquatic ecosystems.

While ecologists can confidently predict *that* changes in water flow regime will change the biota and the ecological functions of a site, exactly *what* changes will be observed is much harder to anticipate. That is, it is hard to predict the magnitude and direction of change in particular cases. More importantly, decisions concerning how much change is acceptable must be made by society; they cannot be decided by science alone. *****

Conference Calls

Pinelands Nursery & Supply's 11th Annual Native Plant Symposium will be held on Wednesday, January 16th, 2002 at the NJ Ecocomplex, Columbus, NJ. Call Pinelands Nursery for details at 800.667.2729.

EPA's Hydrophytic Vegetation Workshop will be held March 20 – 22, 2002 in Atlantic City, NJ. Contact Ralph Spagnolo spagnolo.ralph@epa.gov or Frank Reilly at frank@thereillygroup.net

Ground and Surface Water Supplies: Availability, Physical Constraints, and Limitations

By Anthony S. Navoy, Ph.D., U.S. Geological Survey

Ground water is the primary source of water supply for southern New Jersey. Surface-water is also significant. Many important decisions face the citizens of this region regarding the management of their water resources and the availability of water supply for future needs. The purpose of this presentation is to introduce the important sources of water and to outline the issues and concerns that pertain to each.

Southern New Jersey lies within the Coastal Plain physiographic province. Its geology is a "layer cake" of gravels, sands, silts, and clays that were deposited as river deltas, beaches, and seafloor. The saturated gravel and sand layers, being more permeable, are the aquifers. Wells draw water from the aquifers. The silt and clay layers, which impede the movement of water, are the confining beds. Confining beds can isolate aquifers from sources of contamination. The major aquifers beneath the Coastal Plain of southern New Jersey are the Potomac-Raritan-Magothy aquifer system (commonly referred to as the "PRM"), the Englishtown aquifer, the Mt. Laurel-Wenonah aquifer, the Piney Point aquifer, and the Kirkwood-Cohansey aquifer system (including its related Atlantic City 800-foot Sand aquifer). The primary issues concerning these aquifers are declining water levels as a result of pumpage, saltwater intrusion in coastal areas and deep within the aquifers, depletion of stream baseflow, and contamination from anthropogenic activities where the aquifers lie at or close to land surface.

Landform relief on the Coastal Plain is generally low, the soils are sandy, and streams are relatively small, so conditions for the operation of major water-supply reservoirs are not ideal. Nonetheless, significant water-supply reservoirs have been built; these include Kuehnle Reservoir and Doughty Pond in Atlantic County, Farrington and Duhernal Lakes in Middlesex County, and Glendola, Manasquan, Swimming River, and Brick Township Reservoirs in Monmouth County. Direct stream intakes for water supply are used from the Delaware and Rancocas Rivers in Burlington Co., and Jumping Brook, Matchaponix Brook, and Shark River in Monmouth Co. Many smaller reservoirs and intakes are used to provide water for agriculture and industry. The primary issues concerning these surface-water sources are contamination from point and non-point sources, depletion of source streamflow, and operation during drought conditions.

A primary objective in the management of these water supplies is their use at safe and sustainable rates. Because the volume of surface water reservoirs is readily apparent, sustainable use can be determined in a straightforward manner. This determination for ground-water supplies is much more difficult. As consumptive use increases, withdrawals by wells must be offset by either increases in recharge, decreases in discharge, or a reduction in water stored within the aquifer. Sustainability can only be evaluated once acceptable threshold levels for these factors have been established, i.e. acceptable levels for water-level decline, stream depletion, and saltwater intrusion. Future development in southern New Jersey requiring additional consumptive use of water must address these difficult issues. *

Effluent Reuse Presentation Summary

By Jim Grob, Senior Environmental Specialist, NJDEP

"When the well's dry, we know the worth of water". Benjamin Franklin, 1746

Through the natural water cycle, the earth has recycled and reused water for millions of years. Effluent Reuse, Water Reclamation, Water Reuse or Water Recycling generally refer to projects that use technology to speed up these natural processes.

Approximately 18 months ago, the New Jersey Department of Environmental Protection, Division of Water Quality, developed and made available on the Department's Division of Water Quality Web Page, the Department's DRAFT Technical Manual for Reclaimed Water for Beneficial Reuse. The Manual provided guidance on treatment requirements, as well as related permitting issues for facilities interested in incorporating beneficial reuse requirements into their NJPDES permit. Reclaimed Water for Beneficial Reuse ("RWBR") involves taking what was once considered to be waste, subjecting the effluent to additional treatment in most cases, and using the resulting high-quality reclaimed water for existing and/or new, beneficial uses. RWBR has a myriad of application potentials including the spray irrigation of crops, parks, and golf courses, dust control, fire fighting, aquifer recharge and toilet flushing, to list a few.

An examination of wastewater reuse activities in New Jersey and in other parts of the United States will be the focus of this presentation. The success of specific reuse projects will be reviewed, including a focus on the Evesham's Elmwood Wastewater Treatment Plant Beneficial Reuse Initiative. Planning for water reuse, along with obstacles inherent in implementing water reuse, will also be discussed including financial constraints. Projected costs associated with certain reuse projects will also be examined.

The Department is promoting the implementation of Reclaimed Water for Beneficial Reuse and believes that it is a consideration in any water supply planning activity. As Ecologist, Wendell Berry noted in *Home Economics*, by "using up such goods as topsoil, fossil fuel and fossil water, we incur a debt to the future that we cannot repay. That is, we diminish the future by deeds that we call 'use' but that the future will call 'theft'." *

Agricultural Irrigation Technology: Innovative Designs For Water Management and Conservation

By MaryBeth Sorrentino, Irrigation Water Management Specialist, USDA, Natural Resources Conservation Service

Introduction

The Natural Resources Conservation Service, through the local Soil and Water Conservation Districts in New Jersey, provides technical assistance to the agricultural community in planning, design, and maintenance of best management practices. On South Jersey farms with over 80,000 irrigated acres, water conservation and water quality issues are becoming top resource concerns and irrigation water management practices are taking high priority. These practices are being implemented on an average of 3,000 acres/year resulting in approximately 100,000 to 300,000 gallons/acre/year water savings. Federal and State Cost Share and Incentive Programs are available to help growers implement efficient water management plans and irrigation scheduling. New Jersey farmers have been very proactive and are voluntarily enrolling in these programs. These include the NJ Farmland Preservation, Soil and Water Conservation Cost Share Program and the joint Environmental Quality Incentive Program /State Conservation Cost Share Program. Participating farmers are eligible to receive cost sharing to upgrade and convert to higher efficiency systems, as well as receive incentive payments for implementing a water management plan and following an irrigation scheduling program for water conservation.

Irrigation Water Management Technology

Irrigation systems in New Jersey consist of 80% overhead sprinkler (solid set and portable sprinkler, hydraulic water winches, and center pivots) and 20% micro/drip irrigation (low volume and low pressure emission devices). There is an upward trend in the conversion to micro and drip irrigation systems. Under the conservation programs, an average of 500 acres each year are converting to drip irrigation. These micro systems can operate at 90% application efficiency as compared to 60% or lower for the large overhead sprinklers. Technology is advancing in the micro irrigation arena providing many new and improved products on the market that reduce emitter clogging, provide better pressure compensation for increased uniformity, improve filtration techniques and water treatment methods, and meet specific cropping needs for increased adaptability on the farm. The advantages in crop production - yields and quality, as well as water and energy savings - have inspired many growers to convert to these systems.

In addition to converting to drip, farmers are also implementing the following measures:

1. Irrigation Water Monitoring - Farmers are managing better through the use of flow meters to monitor flow rates and total water use, as well as detecting leaks and clogs in the irrigation system.

2. Irrigation Water Management Plans – Farmers are following plans produced by the Natural Resources Conservation Service (NRCS), to help improve system efficiency through better operation and maintenance procedures and irrigation scheduling based on soils and crop water requirements.

3. Irrigation Scheduling Program - Soil moisture monitoring devices such as tensiometers and resistance meters are being installed to help determine when to irrigate based on % field capacity to prevent over irrigation or under irrigation. In addition, real time weather data (via the South Jersey Resource Conservation and Development Council weather station network and on line computer software program), enables growers to download crop water use data and irrigation scheduling reports.

4. Irrigation Tailwater Recovery Systems - These systems are being installed mostly on container nursery operations. Irrigation runoff and erosion is controlled, and tailwater is collected, treated and recycled back to container stock as irrigation.

5. Water Quality Protection - Chemigation valves, reduced pressure backflow preventors and double check valve assemblies are being installed upstream of injection ports to prevent backsiphonage of fertilizer or chemicals and protect ground water quality against contaminants. In addition, Agri-Chemical Handling Facilities with concrete pads and roofs are being built to load, rinse, and store chemicals at safe distances from water supplies. *****

Conference Calls

The **5th National "MITIGATION BANKING CONFERENCE: Moving Toward Solutions"** will be held on February 27 - March 1, 2002 at the Renaissance Washington Marriott Hotel, Washington, D.C. Conference includes a field trip to three different mitigation banking sites in Virginia. For more information see **http://www.terrene.org/mitigation_trips.htm**

The **National Symposium on Wetlands 2002: Restoring Impaired Wetlands and Other Waters** will be held October 7 – 9, 2002 in Indianapolis, Indiana. See **http://www.core4.org/Core4/Wetlands/Wetlands2002.html**

The **Water Sources Conference and Exhibition: Reuse, Resources, Conservation** will be held January 27-31 2002 in Las Vegas, Nevada sponsored by AWWA and Water Environment Federation. See **http://www.awwa.org/02sources/**

Water Utility Security Resources online:American Water Works Assoc. (AWWA) web site **http://www.awwa.org/public_ep/** for news, updates, security and preparedness tools, and emergency information.

New Jersey's Watersheds

Federation of Gloucester County Watersheds

The Federation of Gloucester County Watersheds is a partnership organization comprised of several watershed associations who work closely together. Throughout the year 2000, Federation Board members and representatives of constituent associations – Watershed Associations for Mantua/ Woodbury Creeks, Raccoon Creek, Oldman's Creek , Upper Maurice River, and the Great Egg Harbor River, met monthly to devise a long range plan for both the umbrella group and the individual associations. The outcome of this process was a decision to expand collaborative efforts in order to accomplish five primary goals:

- To develop greenway preservation corridors along each waterway
- To identify and promote adoption of key municipal ordinances that will enhance watershed protection
- To participate in and actively support the NJ DEP Watershed Management Planning process in Areas 15, 17 and 18.
- To increase membership size and improve membership services by establishing a joint membership program. This will include production of a combined brochure, bi-annual newsletter, shared programming, group insurance, and improvement of the Federation web site, **http://www.sjwatersheds.org**
- To develop and implement a long term plan of funding support for existing and future programs.

On a less formal level, Federation and the **South Jersey Land Trust (SJLT)** operate in partnership; a land acquisition project along the Mantua Creek is supported and guided by the Trust. The SJLT has adopted Raccoon and Oldman's Creeks Watersheds as their next preservation project area.

The Great Egg Harbor River flows for 59 miles draining 304 square miles of watershed land in the heart of New Jersey's Pineland Reserve. The name of the river comes from Dutch explorers who found hundreds of shorebird eggs along the marshes of the Great Egg Harbor bay.

Designated as a National Wild and Scenic River in 1992 and listed as the longest canoeable river on the registry, the Great Egg Harbor River nevertheless has portions which are are not encompassed by the designation. Headwater areas, particularly, are threatened by increasing development and by non-point source pollution engendered by road and building construction and maintenance, increased urban surfaces, septic system problems, and cropland runoff. Increased recreational use threatens the special qualities of the river and watershed.

The Great Egg Harbor Watershed Association (GEHWA) http://www.greategg.org/was formed in 1989 to help educate the residents of southern New Jersey about the Great Egg Harbor River and and engage them in stewardship of the watershed. This river corridor will be protected through a joint effort of the Association and the National Park Service resulting in a Comprehensive Management Plan, completed in October 2000 Ongoing projects include canoe and boat trips and tours; naturalist guided hikes and slide and video presentations. The Association has an Adopt-A-Stream program for schools in the watershed which features watershed macroinvertebrate identification, testing for chemical parameters, physical stream assessments and education about watershed concepts. **The Great Egg Harbor River Council**, a GEHWA subsidiary, is comprised of 12 municipal representatives and GEHWA participants. Facilitated by the National Park Service, the Council will set priorities for funding projects and implement the CMP.

Oldman's Creek Watershed Association was active in the 1960's and revived in 1993. The watershed includes the land from both Salem County and the Gloucester County adjoining the creek, from the headwaters around Hardingville in Elk Township to the Delaware River, a distance of about 25 miles. The large marsh area at the mouth of Oldman's Creek on the Delaware is recognized as one of the premier waterfowl sites in the state, and an important part of the flyway for migratory birds and raptors. Part of the watershed association's mission is to preserve the ecological quality of the watershed, including protecting diverse habitats. There are many state and federally endangered, threatened, or rare species that dependent on this watershed.

Thus with funding from New Jersey Conservation Foundation, Partnership for the Delaware Estuary, Environmental Endowment for New Jersey, the Goodrich Tire company in Pedricktown, and members' contributions, the Oldman's Creek Watershed Association produced a video highlighting watershed natural values and beauty, as well as a slide show and photographic inventory of the creek. This production joins a similar video and slide show highlighting all of Gloucester County's watersheds, both obtainable on inter-library loan.

The Raccoon Creek Watershed is 19 miles long, drains 50 square miles of land, and hosts tens of thousands of migrating waterfowl as well as being the source water for seven lakes. Originally home to the Narraticons, an aboriginal tribe of the Lenni-Lenape, the creek was named for the raccoons, or Narraticons-sippus,who dwelt along the creek. Despite the location of a superfund site near its mouth, (cleanup has recently been completed), industrial sites and municipal sewage treatment plants located along its banks, and increasing development throughout the watershed, the Raccoon Creek has maintained much of its ecological integrity and is one of the most important creeks in southern New Jersey.

Ecological surveys reveal that the creek and adjoining habitats are relatively undisturbed; the vegetation and wildlife are very diverse. The combination of wetland and upland species combine to make the area special, in addition to a diversity of migrating birds, especially neotropical migrants, American bald eagles, thousands of migrating shorebirds and waterfowl and over twenty-one species of fish.

Water quality continues to be threatened from point and non-point source pollution. As a result of the agricultural runoff caused by fertilizer and manure applications, pollution from malfunctioning on-site disposal systems, municipal and indus-

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The Role That Planning Can Play in Managing Water Supply

Excerpts from Address by Sally Dudley, Executive Director, Association of NJ Environmental Commissions, (ANJEC)

The importance of planning in the management of water supply can not be overemphasized. Careful and thoughtful planning helps prepare for the future by assessing future needs against available resources, and identifying potential problems, and strategies to address to address those problems. Planning both involves and informs a wide range of stakeholders on key issues, and is needed at both local and state level to set a framework, based on data, to guide future actions.

The elements of a plan are critical and none should be omitted. The **Inventory** consists of accounting for the natural resources of watershed, e.g. geology, soils, rainfall, topography, surface water, aquifers, recharge areas. It documents current water use and the character and density of existing and proposed development areas. It also identifies the location and nature of preserved or protected land. The plan **Analysis** will provide a careful and in-depth evaluation. The plan's **Relationship to other plans**, e.g. regional wastewater management plan, municipal master plan, state water supply plan, will provide critical context. **Recommendations for future action** will provide the mechanism for implementation of the plan and should be as specific as possible In considering the role of land use, it is important to evaluate pollution sources, the current demand for water, the amount of impervious surface and the degree of wellhead protection.

Planning strategies ideally will follow a guiding principle from planner Robert Le Mire: "Build what needs to be built, save what needs to be saved." The strategy should make use of existing State planning efforts, e.g. the State Development and Redevelopment Plan, the Watershed Management process, and use municipal programs to protect key supplies

What needs to happen: A wider understanding of the connections between land use and water supply is critical. It is essential to provide local officials with tools to assess water supply needs, in order to make the best use of available supplies to enhance protection of important water resources. *

Gloucester County Watersheds

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trial discharges, storm water runoff and commercial development along the creek, the quality of water within Raccoon Creek Watershed ranges from good to poor.

The Raccoon Creek Watershed Association recently completed mapping the watershed on computer, to provide local governments, educators and citizens with critical information on their local environment. The watershed map displays parcels including large areas with farms, subdivisions and residential lots, overlaid onto GIS computer mapping with critical watershed information, and compiled on computer disk to enhance usage by the public. With ArcExplorer software, this CD can facilitate geographic exploration on home and school computers.

The Upper Maurice Watershed, flowing 50 total stream miles to the Delaware River, is a critical stop for migratory birds, and home to more than half of New Jersey's threatened species of plants and animals with unparalleled natural resources including numerous threatened or endangered plant, animal, and bird species. Agriculture or urban development has increased the nutrient/pollutant runoff to some areas; however, in most places water quality is good.

The Upper Maurice River Watershed Association http://www.igc.org/mauriceriver recently sponsored the 5th annual WaterFest, a county-wide festival celebrating waterways and water resources of Gloucester County. Held each year in June in Scotland Run Park, it has featured over 25 environmental organizations, at least 20 "environmental" crafters, a "critter" search, a kids' casting contest, and music.

Open Space preservation efforts will soon result in the Association's first acquisition of property along Mantua Creek, where they have also done streambank restoration. The group has an active Storm Drain Labeling program with labels which will last 10 years printed on road tape. Additionally a number of sites within the watershed were selected by the Soil Conservation District consortium for Stormwater Management Projects. *

TMDL Seminar in January 2002

New Jersey Water Resources Research Institute, together with the Civil and Environmental Engineering department of Rutgers University, is pleased to present Dr. Kenneth H. Reckhow in a special Seminar in Water Resources entitled **"Assessing the Total Maximum Daily Load (TMDL) Approach to Water Quality Management."** Scheduled for Wednesday, January 30, 2002, from 4:00 to 5:30 P.M, the seminar will be located in the Fiber Optics Auditorium of Busch Campus, Rutgers University. Dr. Reckhow, a professor at Duke University and Director of North Carolina Water Resources Research Institute, is the Chair of the ***National Research Council Committee to Assess the Scientific Basis of the TMDL Approach to Water Pollution Reduction*** for the U.S. Congress. Dr. Reckhow will also be meeting with small groups during his visit. For more information contact Jeannine Der Bedrosian, 732.932.9632 or email derbedrosian@aesop.rutgers.edu

Features

New Jersey Flows

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