RESOURCE PAPER

Protecting Our Streams

ASSOCIATION OF NEW JERSEY ENVIRONMENTAL COMMISSIONS

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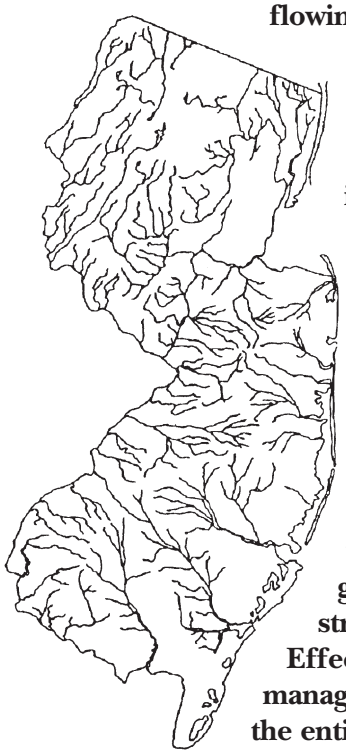
New Jersey's streams and rivers are the source of our drinking water, scenic beauty, recreational opportunities and wildlife habitat. For the purpose of this paper, stream systems, generally referred to as stream corridors, extend beyond the water flowing in the channel to include the stream banks (or riparian area), adjacent wetlands, the floodplain and ecosystems of important biological diversity. Protecting the entire stream corridor is the best way to protect the health of the stream.



Regulatory programs have focused on solving specific problems like flood control and wastewater discharge, but generally don't address the stream system as a whole. Effective stream corridor management requires addressing the entire system – the stream's hydrology and ecology – to solve problems of surface water pollution, loss of groundwater recharge and decline in animal and plant habitats.

Environmental commissions, as advisors and educators at the local level, can play a significant role in preserving and improving stream quality. This publication aims to help environmental commissioners, other local officials and interested citizens understand the importance of stream corridors and how to protect and improve our streams.

A "stream" is a general term for a body of flowing water within a drainage network. Hydrologists apply the term to the water flowing in a natural *channel* as distinct from a canal. Streams show different characteristics depending on size and location in the landscape. Hydrologists, state and federal agencies use several different approaches to classify streams. One approach focuses on how the water flows.

- **Perennial –** flowing continuously;
- **Intermittent or seasonal –** flowing only at certain times of the year when the stream receives water from springs or from some surface source like melting snow in mountainous areas;

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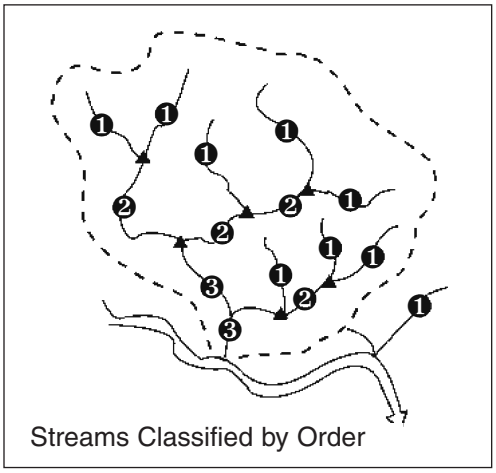
- **Ephemeral** – flowing only in direct response to precipitation, and with channels at all times above the water table.

Another approach classifies streams by size and location in the hierarchy of drainage toward a river. First-order streams are small tributaries that join together to form a larger, second-order stream; second-order streams join to form a third-order stream, etc. Generally headwaters, or first-order streams, are clear and shaded by trees. They are the origin of the stream system and critical to the health of downstream waters. Headwater streams usually have abundant aquatic insects and small fish on stream bottoms. The larger order (e.g. third or fourth order, etc.) streams and rivers may be slow-moving, muddy, with canopy trees covering only shorelines, and inhabited by larger fish and mud-dwelling organisms.

How Stream Corridors Function

Natural stream corridors are systems with associated wetlands, floodplains, woodlands, forests and/or steep slopes, through which most of the water drains from upland surfaces. Streams receive water from precipitation, surface runoff and ground water from springs and seeps. The woodlands and wetlands in the stream's watershed absorb precipitation and gradually release it into the stream. This is the stream's "baseflow," which keeps it running in periods of light or no rainfall. This link between ground and surface water can flow both ways; in wet seasons, streams may contribute to the ground water.



SOURCE: CHESTER CO. WATER RESOURCES AUTH., PA

Streams Classified by Order

Vegetated stream banks, nearby woodlands, wetlands and floodplains also help maintain water quality. Streamside vegetation takes up nutrients, and soil and organic material on the banks can help filter pollutants and sediments from stormwater runoff. Slowing the flow of runoff into a stream also gives organic material a chance to settle out instead of overloading the stream. Requiring buffer areas along streams helps preserve the vegetated banks and limits channel erosion.

Stream corridors are major habitats for plants and animals. The streams and adjacent areas support a wide variety of species. The headwaters of streams are the seeps and springs where organisms in leaf litter form the base of the food chain for the entire stream system. Downstream, larger animals and other plants make up an intricate community higher in the food chain.

The quality of water in larger streams has a close connection to the quality of water from their source – the headwater or first-order streams. Protecting the headwaters areas is critical in order to maintain or improve water quality in the lower reaches. For example, Primrose Brook and the upper Passaic River – the only streams with high water quality in the Great Swamp watershed – originate in public lands that have remained in a vegetated, undeveloped state, thus protecting the headwaters area.

Impacts of Human Activity

Human activity has an impact on stream quality and ability to function. Industry, agriculture, urbanization and changing land use patterns all contribute to deterioration of a stream's water quantity, water quality, wildlife habitat, and recreational opportunities.

Development and land use practices can dramatically affect streams. As impervious surfaces like roofs and pavement cover the land, less water infiltrates the soil to replenish groundwater. More runoff travels faster over the surface, gathering pollutants and increasing peak flooding, erosion and sediment levels. In the end, increased volumes and velocity of runoff degrade water quality.

Tom Schueler formerly with the Center for Watershed Protection *(www.cwp.org)* collected studies from around the country measuring the effect of impervious cover in a watershed on the health of a stream. Generally, when impervious cover is less than 10 percent of the watershed's area, the streams have stable channels, good water quality and good biodiversity. Watershed impervious cover

Development Impact on Streams		
Development	**Impact**	**Principal Result**
Reduced riparian cover, use of fertilizers, and increased sunlight	Excess nutrients	Increased algal growth
Increased urbanization More impervious cover	Increased rate of flow Decreased infiltration	Changes in water flow with high/low extremes result in sedimentation and low base flows
Storm sewers and concentrated runoff, piping small streams	Changed runoff patterns	Changes in natural stream flow that result in flooding and erosion
Adapted from *Surface Water and Riparian Areas in the Raritan River Basin* report from September 2002. Deborah Newcomb, primary author		

between 10 percent to about 25 percent causes widening of stream channels to handle the increased runoff, and declining water quality and biodiversity. When watershed imperviousness exceeds 25 percent, the water quality and biodiversity of the stream are poor.

Wildlife suffer from the effect of man's activities on the watershed. Decreased dissolved oxygen and increased pollution impair plant and animal life. As stream banks are cleared of shading vegetation, water temperatures rise and algae grow in the increased sunlight. Clearing vegetation also removes sources of food and shelter. As a result, fewer species can survive in the altered stream environment.

As stream health deteriorates, recreational opportunities also diminish. Boating, bird watching and fishing become less successful. Walking and jogging paths may be interrupted if development is allowed in the stream corridor. These recreational activities are important as they create educational opportunities and build advocacy for stream protection.

Streams receive pollution in two ways, from "point sources," which are direct discharges to surface waters through pipes, and from "nonpoint sources" or runoff.

Pollution from Pipes – Point Sources

The New Jersey Department of Environmental Protection (NJDEP) regulates point sources, which discharge industrial or sewage waste to surface water. NJDEP bases discharge standards on State-established stream classifications. The standards require that discharges maintain or improve water quality. Standards are very high for discharges to Category One streams, which include streams where trout breed and live (trout production and trout maintenance streams), as well as most streams that feed water supply reservoirs. Trout require cool, well-oxygenated waters and are a standard indicator of high water quality in higher elevations in New Jersey. Standards are less demanding for warmer waters that support other fish species or have no direct connection to water supply.

Although much progress has been made in improving the quality of point source discharges (over 5,000 are permitted in the state), some discharges have been allowed without regard to their cumulative impact, and some may not be meeting the effluent limitations of their permits.

PETER CRAIG

Urbanized streams exhibit severe erosion, flash flooding, broadened stream channels and degraded water quality.

Environmental commissioners and town clerks receive notice from NJDEP when anyone applies for a permit to discharge to surface water under the New Jersey Pollution Discharge Elimination System (NJPDES). The commissions should examine the application and evaluate the proposal – the need for the permit, the location of the discharge and the potential negative impacts. They should communicate their findings to NJDEP, the applicant and the town.

To determine the location and source of local permitted surface water discharges, go to the NJDEP website, which has downloadable GIS data, available at: *www.state.nj.us/dep/dwq/database.htm*. If you do not have GIS software on your computer, you can find this information at: *www.state.nj.us/dep/dwq/database.htm#njems*

Pollution from Runoff – Nonpoint Sources

According to US Environmental Protection Agency (EPA), about half the pollution in New Jersey's surface water comes from nonpoint sources, delivered by stormwater runoff flowing into streams and lakes and their related groundwater systems. Development dramatically increases nonpoint source pollution by increasing the volume of water and the level of pollutants in the runoff. Increased runoff causes erosion and sediment buildup in streams, carries nutrients from fertilizers, and washes toxics, bacterial contamination, road salt, motor oils and litter into the stream.

Sediment from runoff represents nearly half the nonpoint source pollution in our streams. Made up of fine particles of eroded soil or sand, sediment smothers aquatic life, carries pollutants like heavy metals that are bound to soil particles, and makes water cloudy. Sedimentation reduces oxygen in streams and clogs the gills of fish. Common origins are sites cleared of vegetation for construction, timber harvest and farming. Research has shown that erosion from land disturbance for development is about 10 times greater than from agricultural row crops, 200 times greater than from pastureland, and 2,000 times greater than land in timber.

Nutrients include nitrogen and phosphorus that are needed for plant growth. High levels of these substances can cause a health hazard in drinking water. They also stimulate excessive aquatic plant growth and cause lower dissolved oxygen levels in the water, ultimately smothering fish and other aquatic life. Excess nutrients create algal blooms and turbid conditions that eliminate submerged vegetation and destroy habitat and food supplies for aquatic animals and waterfowl. Sources of excess nutrients include fertilizers from lawns and farms, animal waste, septic systems and auto emissions.

Pathogens are disease-causing bacteria and viruses associated with the presence of fecal matter. They affect human health directly through contact with contaminated water and through consumption of shellfish. Sources include failing sewer or septic systems or animal waste.

Toxic Contaminants include substances like heavy metals and pesticides. Because they resist breakdown and accumulate in organisms, they threaten the food chain. Sources include industrial, commercial, household and agricultural chemicals, and toxics from auto emissions.

Debris consists of various items of trash like old tires, shopping carts and plastics from illegal dumping and street litter. Debris threatens aquatic life and detracts from recreational and aesthetic values.

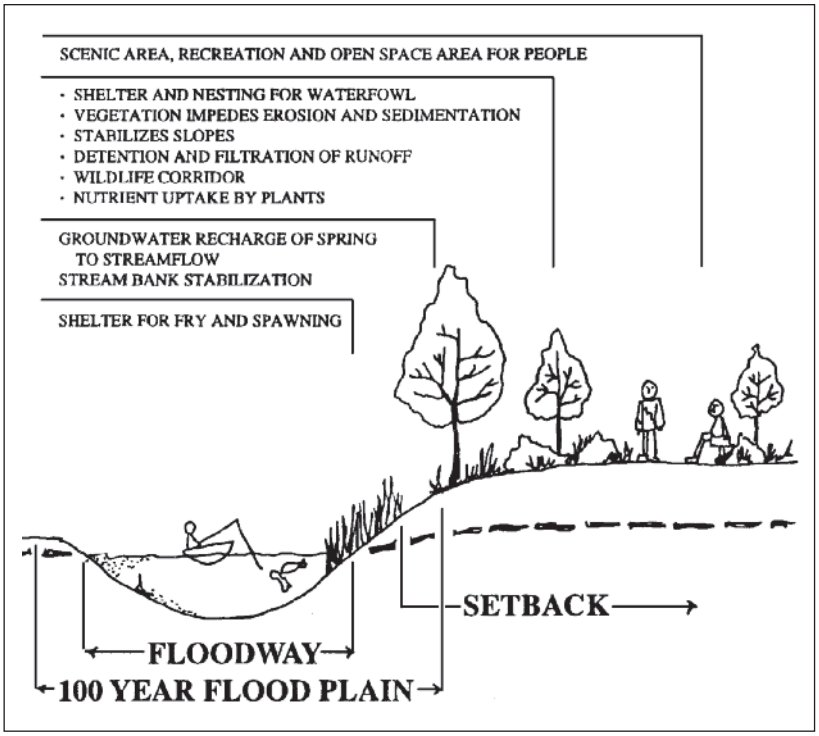
Thermal Stress, or elevated water temperature, reduces survival rates and disease resistance of valued native species and allows the spread of non-native (exotic) species. It negatively impacts biologic diversity. Causes include increased pavement near streams and loss of vegetated stream buffers.

Options for Stream Protection

Mapping is the cornerstone of a Stream Corridor Protection Plan because it identifies the whole stream system. The Environmental Resources Inventory (ERI) should contain a map of stream corridors that, in turn, should be incorporated into the town's Master Plan, Greenway and/or Open Space Plan. The ERI should have text to accompany the map explaining how stream corridors function in maintaining stream health. The Master Plan can include recommendations for stream corridor protection.

In mapping stream corridors, commissions can use many sources of data, which should be available at the municipal planning department or county planning office. For example:

- County Soil Conservation District maps identify wet soils;*
- US Geological Survey topographical maps show slopes;*
- NJDEP wetland maps show approximate location of wetlands;*
- NJDEP recharge maps show approximate location of recharge areas;*
- NJDEP Landscape Project maps show threatened and endangered species habitat. Available at *www.nj.gov/dep/gis/depsplash.htm*;
- NJDEP Land Use/Land Cover maps show land cover, important in locating impervious cover.*



Stream Corridor Functions

Important components of a Stream Corridor Protection Plan are field checking and mapping of headwaters of streams, including seeps and springs. These areas make a major contribution to water quality and are also especially vulnerable to negative environmental impacts.

Protecting Stream Buffers

Buffers, undisturbed vegetated areas alongside a stream, are essential components of stream protection. Buffers are so important in protecting streams that stormwater regulations enacted by NJDEP in February 2004 require a 300-foot riparian or stream corridor (Special Water Resource Protection Area) for all Category One streams and all streams in the Highlands Preservation Area.

The NJDEP allows encroachment into the Special Water Resource Protection Area under certain limited circumstances. Through a functional values analysis, an applicant must demonstrate that the functions and overall condition of the buffer will be maintained to the maximum extent practicable. The applicant must assess the impact and show how the project will meet DEP standards for:

- the buffer's habitat,
- nonpoint source pollution reduction,
- water temperature modification,
- and channel integrity.

The Wastewater Management Plan regulations passed in 2008 require towns to pass an ordinance creating buffers for all streams. The NJDEP model riparian zone ordinance establishes these minimum fixed buffer widths:

- 300 feet on both sides of Category One water and upstream tributaries within the same HUC-14 or sub-watershed;
- 150 feet on both sides of:
  - an upstream tributary to a trout production stream not in the HUC 14 watershed;
  - a trout maintenance waterway and all upstream tributaries within one mile;
  - any segment of a water body flowing through an area containing documented habitat for a threatened or endangered species of plant or animal;
  - any segment of a water body flowing through an area containing acid producing soils;
- 50 feet along both sides of all other waters.

The buffers must be considered during subdivision or site plan development review.

* *Available as data downloads from the NJDEP GIS web page, www.nj.gov/dep/gis/*

The municipality should also consider zoning changes that might be needed. The model riparian zone ordinance (*www.state.nj.us/dep/watershedmgt/rules.htm*) that incorporates minimum standards also has the following provisions:

"1. All new major and minor subdivisions and site plans shall be designed to provide sufficient areas outside of the riparian zone to accommodate primary structures, any normal accessory uses appurtenant thereto, as well as all planned lawn areas.

2. Portions of lots within the riparian zone **must be permanently restricted by deed or conservation easement** held by *[municipality]*, its agent, or another public or private land conservation organization which has the ability to provide adequate protection to prevent adverse impacts within the riparian zone."

The model ordinance also requires a detailed stream corridor restoration plan where certain allowed projects (i.e., for public safety, exceptional hardship) will disturb the buffer.

Municipal programs can educate landowners about proper management of their environmentally-sensitive streamside land and encourage the voluntary donation of conservation easements.

Floating Buffers Protect the Stream's Ecosystem

Although fixed stream buffers require little research and are usually simple to administer, municipalities may wish to use "floating" or variable width buffers. Floating buffers are more flexible as they are defined more by topography than uniform linear measurements. Such buffers protect floodplains, wetlands, mature woodlands, steep slopes and/or wet soils. These features usually vary a great deal within a stream corridor. Important scenic and cultural factors also may be included.

For a discussion of floating buffers, see *Riparian Buffer Strategies for Urban Watersheds,* Metropolitan Washington Council of Governments, 1995.

Municipal stream corridor ordinances can be stricter than the NJDEP minimum standards. Environmental commissions should encourage their municipalities to pass ordinances to protect the entire stream ecosystem. ANJEC has several municipal stream corridor ordinances in its ordinance database that can help provide guidance to interested towns.

Environmental commissioners should insure that planning boards require, as part of site plan and subdivision approval, that developers grant permanent conservation easements on stream corridors or buffer areas, recorded on deeds. The town should also establish regular easement inspections to insure continued easement protection. In developed areas, the municipality may decide to acquire buffer areas as part of a park, open space, or greenway plan.

Environmental commissions can encourage the preservation of existing vegetation and replanting of native vegetation along bare stream banks as important steps to preserve and improve stream quality. Use of native vegetation in landscaping minimizes the need for pesticide and fertilizer use, and requires less frequent watering and mowing.

Monitoring and Restoration

Development and changes in land cover have negatively impacted many of New Jersey's streams. However, stream restoration activities often can improve the stream's functioning and aesthetics.

Monitoring and sampling are important components of stream restoration. Chemical sampling provides a "snapshot" of the stream at a particular moment in time. Obtaining baseline information, which includes sampling during low-flow and high-flow periods, is important so that subsequent sampling on a regular basis will determine changes in the stream over time. Macroinvertebrate sampling establishes longer-term water quality trends. It involves sampling the number and variety of macroinvertebrate species in streams. The more species a stream has, the better the water quality. Watershed groups have made valuable contributions to collection of macroinvertebrate data around the state.

To insure that the monitoring efforts are productive, proper data collection and management are critical. The State has official protocols for assuring the accuracy of collection and analysis of data – quality assurance/quality control

procedures (qa/qc) that commissions or citizen groups should adhere to. Some recommendations for monitoring over a period of time include:

- use of standardized data sheets and recording procedures;
- strong encouragement for freely recording all on-site observations;
- keeping data in one place and maintaining a backup copy;
- calibrating and keeping maintenance records for all field equipment.

Benefits of Preserved Buffers and Their Elements

Buffer Zones

- Protect the stream from excessive flow variations;
- Control bank erosion and protect stream ecology;
- Protect existing dense vegetation that shades the stream;
- Provide sediment control during storm events;
- Provide ideal environment for wildlife and preserve stream integrity;
- Filter out pollutants discharged by point and nonpoint sources.

Undisturbed Wetlands

- Help stabilize water supply by replenishing groundwater during dry periods;
- Minimize effects of erosion by acting as siltation basins;
- Help maintain stable flows in associated streams;
- May function as groundwater recharge area;
- Serve as habitat for plants that filter excess nitrogen and phosphorus from water;
- Provide breeding sites for commercially valuable waterfowl and some fish;
- Serve as productive areas for silviculture and agriculture;
- Provide habitat for many varieties of non-game wildlife and plants;
- Help dissipate the energy from floods and serve as water storage areas;
- Can serve as an open space, recreational, educational, and aesthetic resource;
- Have a large capacity for nutrient recycling.

Undisturbed Floodplains

- Retard flooding by storing stormwater and slowing velocity of flow;
- Provide valuable natural habitat for wildlife;
- Provide good groundwater recharge areas that may contain fertile agricultural land;
- Support productive plant communities that help to maintain water quality and aquatic life;
- Can serve as an open space, recreational, educational and aesthetic resource.

Undisturbed Woodlands

- Stabilize and enrich the soil;
- Slow runoff and control erosion;
- Filter water that enters the groundwater system;
- Moderate the effects of winds, storms and extremes of climate;
- Add leaf litter to the stream as basis for the aquatic food chain.

Undisturbed Steep Slopes

- Control soil erosion and protect up-slope lands;
- Minimize pollution of surface waters and reduce flooding;
- Preserve banks of streams and maintain water flow in headwaters;
- Provide excellent habitats for many varieties of plant and animal life.

(Adapted from a chart developed by the Stony Brook–Millstone Watershed Association.)

Daylighting Streams

A dramatic restoration option, daylighting refers to liberation of streams from pipes or culverts to put them back in touch with the riparian area. Ideally, the streams can be redirected to the natural channel, but sometimes that isn't possible.

There are many reasons to daylight streams. They include:

- providing the aeration important to water quality;
- recreating aquatic habitat;
- reducing runoff velocity through meandering channels;
- diverting urban runoff from combined sewers;
- linking urban greenways;
- beautifying neighborhoods.

Possible obstacles might be:

- the need for a substantial amount of grading and excavation;
- difficulty in finding the old channel;
- less chance of recreating natural channel geometry and a vegetated riparian corridor;
- weak community support if residents lacked knowledge of the buried stream;
- the need for careful engineering so the project will fit into the overall stormwater management system.

Case studies of examples of daylighting can be found in "Urban Stream Daylighting" Virginia Water Resource Research Center, 2007, *www.vwrrc.vt.edu/pdfs/specialreports/sr352007.pdf*

Municipal Ordinances Related to Stream Protection

A number of different ordinances can help protect water quality and stream corridors. Stormwater management, soil erosion and sediment control, and septic system standards and management are especially important. In all these areas, the environmental commission can work with elected officials to enact ordinances with the needed provisions. Once the ordinances are in place, the commission needs to work with the planning and zoning boards and applicants to make sure development plans meet the ordinances' standards.

BARBARA PRETZ

Stream Monitoring

Stormwater Management

Buffers alone do not sufficiently protect streams from increased runoff and the pollution it brings. NJDEP requires municipalities to adopt stormwater management ordinances that control stormwater in new developments by incorporating, to the maximum extent practicable, non structural methods such as vegetative swales, dispersal of flow, low impact development and impervious cover restrictions. The NJDEP model stormwater management ordinance can be found at *www.njstormwater.org/tier_A/pdf/NJ_SWBMP_D.pdf.* The NJDEP manual *Best Management Practices for Control of Nonpoint Source Pollution from Stormwater* describes a variety of techniques for nonstructural stormwater management (available at *www.nj.gov/dep/stormwater/bmp_manual2.htm*).

Erosion Control

During review of subdivision and site plan applications, make sure that the applicant incorporates measures to reduce erosion during development:

- Steer development to suitable soils.
- Insure that stockpiled soil is protected and located outside the stream buffer area.
- Reduce runoff velocity and control its volume by using nonstructural methods such as grassed swales, infiltration areas and other techniques described in the NJDEP BMP manual.
- Insure that as little of the site is disturbed at one time as possible.
- Have controls in place before construction starts.

- Determine whose responsibility it is to monitor sites to insure contractors are following agreed-on management practices.
- Require that stone be set down where construction vehicles enter and exit the site to prevent tracking of sediment.

Installing and Managing Septic Systems

Municipalities may adopt septic system standards, subject to State review, which are more restrictive than those required by State regulations. An ordinance requiring buffers for septic systems is an important management option. Current state regulations for on-site septic systems require only a 25-foot setback for septic tanks from waterbodies and 50 feet for disposal fields. Several NJ towns require 100-foot distances between septic systems and water bodies to protect water from possible contamination. A septic management ordinance should require inspection and maintenance of existing septic systems.

Pumping septic tanks at regular intervals maintains and improves septic system functioning and protects ground and surface water quality. The new Wastewater Management Plan rules require towns to pass septic pumping ordinances. The septic system's function is drastically limited if the tank is not properly maintained. For example, if the sludge level in the bottom of the tank builds up so that sludge is carried to the field, it will block release of the liquid, which can then back up and overflow the tank, or can break out to the surface of the septic field. If homeowners do not properly operate their septic systems, the tanks will be susceptible to damage caused by solvents, which kill the active bacteria essential to the breakdown of sludge. In addition, grease and oils can clog vital tank components.

Other Ordinances

Other local ordinances are important instruments for stream corridor and water quality protection.

- Aquifer recharge ordinances control the uses on lands that provide recharge for groundwater supply.
- Clustering/open space ordinances allow development to be arranged on smaller-than-zoned lots on part of a site with the remaining land permanently preserved as open space; no increase in density over that allowed under the conventional zone designation is allowed.
- Noncontiguous development ordinances allow cluster development on parcels not connected to each other. For example, density can be concentrated on one parcel while the noncontiguous parcel remains preserved as open space.
- Floodplain protection ordinances limit disturbance allowed in floodplains in order to protect stream buffers and prevent flood damage.
- Limestone ordinances provide special protection to groundwater in limestone areas, which are subject to collapse or may be linked directly to ground water supplies.
- Shade tree protection ordinances regulate tree removal, and set standards for replacement and reforestation.
- Steep slope protection controls development on slopes over 15 percent, with prohibition of use on slopes above 25 percent to minimize erosion and sedimentation.
- Useable Lot Area ordinances require that a minimum area of a lot being created for subdivision be free of environmentally critical areas.
- Zoning Densities can be based on natural carrying capacity to protect critical areas (lower densities reduce impacts).

How Environmental Commissions Can Help

Environmental commissions have many opportunities to work with local officials and organizations to develop educational materials and programs to promote protection of local streams and rivers. All these activities will also help towns comply with the State's stormwater regulations. A few examples:

- Inform citizens about the proper disposal of motor oil and other hazardous waste;
- Advise residents on the correct use of fertilizers and pesticides;
- Sponsor litter cleanups;
- Organize wildlife surveys, water monitoring programs, lawn care workshops, tours by canoe or on foot;
- Write op eds for the local weekly newspaper;
- Involve citizens, local elected officials, school boards, staff and students in Stream Corridor Protection and Stormwater Pollution Prevention plans;

- During site plan review, encourage the use of natural rather than mechanical means of stormwater management when appropriate;
- Encourage boards to insure that applications reflect proper stream buffer widths.

State and Regional Regulatory Programs

Flood Hazard Areas

The Flood Hazard Area Control Act is implemented by the Flood Hazard Area Regulations (N.J.A.C. 7:13 1.1 et seq.) The regulations set standards for two areas – the 100-year flood plain and the riparian corridor. The objective of these regulations is to minimize damage caused by flooding, to minimize degradation of stream water quality from point and nonpoint pollution sources, and to protect wildlife and fisheries.

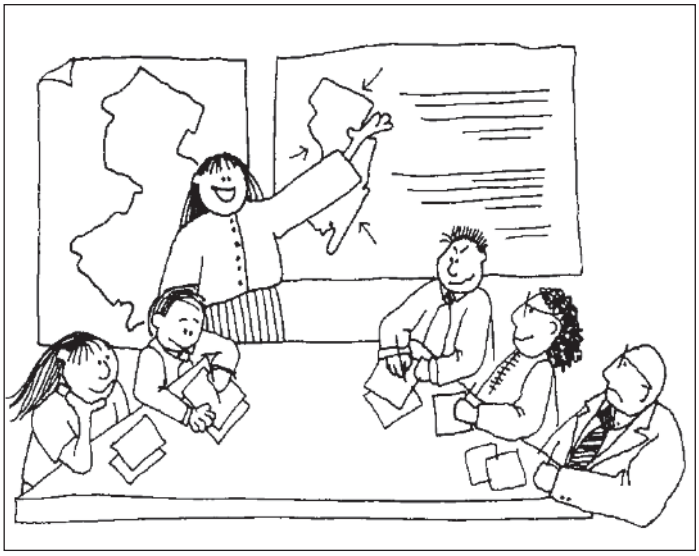
Permits are required for construction activities in the 100 year floodplain or flood hazard areas on all streams with over a 50-acre drainage area. Permits include requirements for use of best management practices to reduce negative impacts on streams. Riparian corridor permits are required for all streams. (For Category One, for activities within 300 feet; for trout-associated, 150 feet; for all other streams, 50 feet.)

Soil Erosion and Sediment Control

NJ Soil Erosion Sediment Control Program – The county or regional Soil Conservation District (SCD) must certify soil erosion and sedimentation plans for disturbances of more than 5,000 square feet of surface area involving more than one single-family dwelling and requiring a building permit. The state law (*Soil Erosion and Sediment Control Act,* N.J.S.A. 4:24 1 et seq.) does not regulate smaller disturbances, which also can cause erosion and sedimentation. Local grading ordinances can regulate smaller areas.

Stormwater Management and Stream Corridor Protection

Phase I EPA Stormwater Regulations – As required by the federal *Clean Water Act* amendments of 1987, NJDEP implemented the Phase I EPA Stormwater Regulations in 1993. The purpose is to prevent rainwater from coming into contact with chemicals and other industrial pollutants. The regulations apply to industries like chemical plants,


BARBARA PRETZ

paper companies, vehicle scrap yards, food manufacturers and print shops. Most facilities have complied by moving materials indoors or covering them with a roof or tarpaulin. Businesses had to submit their plans to NJDEP and are subject to spot inspection.

Phase II EPA Stormwater Regulations – NJDEP adopted regulations to implement Phase II EPA Stormwater Regulations in 2004, to address pollutants from storm drainage systems owned or operated by municipalities, large public complexes and highway agencies. Under a NJ Pollution Discharge Elimination System (NJPDES) permit, these entities had to complete a Stormwater Management Program for their respective jurisdictions within five years. For existing development, the NJPDES permit requires:

- public education programs about nonpoint source pollution that include distribution of education materials or an outreach program about the impacts of stormwater discharges on surface and ground water as well as the steps the public can take to reduce pollutants in stormwater runoff;
- detection and elimination of illicit connections to storm sewer systems. Under this requirement, municipalities must prohibit, through an ordinance or other mechanism, illicit connections to the stormwater systems. Illicit connections consist of discharges of domestic sewage, process or other industrial waste, any source of pollutant, or any non-physical connection that discharges domestic sewage from

a sanitary sewer system (i.e., leaks, overflows);
- good housekeeping practices in public works yards and on municipal streets;
- public involvement and participation in formulation of the stormwater plan.

Local school boards are independent of municipalities and are not subject to the EPA Phase II stormwater permit. It's a good idea for municipal governing bodies to invite their school boards, staff and students to participate in formulating a town's stormwater plan. This involvement will encourage "buy-in" by students and parents. School grounds and parking lots should be subject to the same good housekeeping practices as the rest of the municipality. Providing students and teachers with the nonpoint source pollution information will also help spread the word and help encourage more residents to take action to improve stormwater management.

Use of Integrated Pest Management (IPM) on public lands can substantially reduce runoff of pesticides into waterways. IPM encourages use of the minimal amount of the least toxic pesticide to control pests. A number of New Jersey towns have adopted IPM to reduce use of pesticides on town-owned land. New Jersey's *School IPM Act* of 2002 requires use of IPM on school grounds.

The Delaware and Raritan Canal Commission regulates stormwater runoff within its 400-square-mile drainage basin, and visual impact within 1,000 feet of the D & R Canal, a major source of drinking water in central New Jersey. In addition, the Commission has recently adopted stream corridor protection regulations, which prohibit construction of major projects within the stream corridor, defined as the stream and its tributaries, the 100-year floodplain and a 100-foot buffer on both sides of the floodplain. For information: D & R Canal Commission, P.O. Box 539, Stockton, NJ 08559 (609) 397-2000.

Water Pollution

Water Quality Management Plans address water pollution through wastewater facility planning and prevention of water pollution from wastewater and stormwater runoff and other nonpoint sources. NJDEP requested counties take responsibility for creating or updating Wastewater Management Plans, a required element of WQMPs. All counties accepted the responsibility except Bergen, Passaic, Union and Warren. Municipalities in these counties are responsible for compiling their own municipal Wastewater Management Plans. NJDEP permits must be consistent with all plans.

The New Jersey Pollutant Discharge Elimination System Regulations or NJPDES (N.J.A.C. 7:14A1 et seq. and N.J.A.C. 7:91 1 et seq.) implement the NJ *Water Pollution Control Act* by regulating discharges to surface and groundwater. Discharges must not degrade a stream's water quality based on the NJ Surface Water Quality Standards (see below). NJDEP sends notice of NJPDES and related permits to several municipal agencies, including environmental commissions. Environmental commissions should identify and map permitted discharges as part of a stream corridor protection program.

Surface Water Quality Standards (N.J.A.C. 7:9 4.1) are the basis for requirements that discharges to surface water must meet. The regulations list the maximum allowable concentration for such substances as bacteria, dissolved oxygen and various chemicals. These allowable concentrations vary depending on how the stream is classified. The standards also contain a list of all New Jersey streams and their classifications, such as trout production, non trout, estuarine, etc. For information: *www.state.nj.us/dep/wms/bwqsa/factsheet1.pdf* or NJDEP, PO Box 029, Bureau of Water Quality Standards and Analysis, Trenton, NJ 08625 0029 (609) 633-7020.

Wetlands

The Freshwater Wetlands Protection Act, implemented by Freshwater Wetlands Protection Regulations (N.J.A.C. 7:7A 1.1 et seq.), regulates almost all activities in New Jersey's freshwater wetlands, transition areas, lakes and ponds. Depending on the classification of the wetland, buffers range from 25 to 150 feet. Buffers of 150 to 75 feet are required for wetlands draining into trout production waters or that provide habitat for threatened and endangered habitat.

Activities under the jurisdiction of the *Pinelands Protection Act* and the *Hackensack Meadowlands*

Reclamation and Development Act are not subject to the permit requirements of the *Freshwater Wetlands Protection Act,* but are regulated directly by the respective commissions and the Army Corps of Engineers.

Coastal wetlands are regulated under N.J.A.C. 7:7E 3.26, which states that "all land within 300 feet of wetlands...and within the drainage of those wetlands comprise an area within which the need for a wetlands buffer shall be determined."

Wild & Scenic Rivers Programs

Passed in 1977, the *NJ Wild and Scenic Rivers Act* (N.J.S.A. 13:8 45 et seq.) established a State policy to preserve, protect and enhance those rivers that have outstanding scenic, recreational, natural or cultural resources. Rivers can be classified as wild, scenic, recreational, or developed recreational. Lands in the designated areas are to be managed by a local river commission or by the State if no commission is formed. This program's regulations expired in 1995 and are now inactive due to lack of funding. Only the upper reaches of the Mullica River in Wharton State Forest have been designated in the State program.

The federal Wild and Scenic Rivers Act (16 U.S.C. 1274(a)) provides for the following designations:

- Wild rivers are inaccessible and essentially primitive and unpolluted.
- Scenic rivers have largely undeveloped shorelines but are more accessible.
- Recreational rivers are easily accessible, may have diversions or impoundments, and may be in or near urban areas.

The federal government has designated three rivers in New Jersey – the Lower & Middle Delaware, the Great Egg Harbor River, and the Maurice River.

The National Park Service works with landowners and local governments to create an agreed upon river management plan. For information: Northeast Region National Park Service, U.S. Custom House, 200 Chestnut St., Fifth Floor, Philadelphia, PA 19106 (215) 597-7013.

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ANJEC is a statewide non-profit organization that informs and assists environmental commissioners, municipalities and interested citizens in preserving and protecting New Jersey's environment.

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