RESOURCE PAPER

Protecting Our Streams

ASSOCIATION OF NEW JERSEY ENVIRONMENTAL COMMISSIONS

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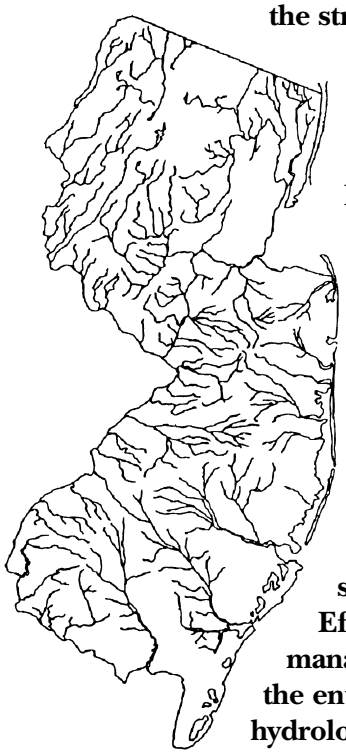
New Jersey's streams and rivers are the source of our drinking water, scenic beauty, recreational opportunities and wildlife habitat. Stream systems, generally referred to as stream corridors, extend beyond the water flowing in the channel to include the stream banks (or riparian area), adjacent wetlands, 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 develop and carry out a stream corridor plan to protect and improve our streams.

Streams Classified

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

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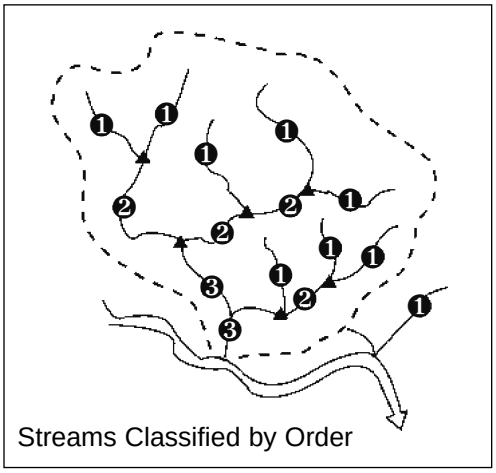
from springs or a surface source like melting snow in mountainous areas;
- **Ephemeral** – flowing only in direct response to precipitation, and with channels at all times above the water table.

The Pennsylvania Department of Conservation and Natural Resources (www.dcnr.state.pa.us/wlhabitat) describes several different kinds of classifications. One relates river systems to habitat types:

- **Tidal** – fluctuating water levels with tides;
- **Lower perennial** – permanent, slow moving waters with well-developed floodplain;
- **Upper perennial** – permanent fast flowing waters with little flood plain area;
- **Intermittent** – non-tidal flowing water for only part of year.

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) streams and rivers may be slow-moving, muddy, with canopy trees covering only shorelines, and inhabited by larger fish and mud-dwelling organisms.



SOURCE: CHESTER CO. WATER RESOURCES AUTH., PA

Streams Classified by Order

How Stream Corridors Function

Stream corridors are systems of wetlands, floodplains, woodlands, forests and steep slopes associated with streams, 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 groundwater.

Vegetated stream banks, nearby woodlands, wetlands and floodplains help maintain water quality. Streamside vegetation takes up nutrients, and soil and organic material on the banks can help filter pollutants and sediments. Slowing the flow into the stream also gives organic material a chance to decompose instead of overloading a stream.

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 leaf litter forms the base of the food chain for animals in the entire stream system. Downstream, larger animals and other plants make up an intricate self-supporting community.

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 a stream's lower reaches. For example, Primrose Brook and the Upper Passaic River – the only streams with high water quality in the Upper Passaic 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 its ability to function. Industry, agriculture, urbanization and changing land use patterns all contribute to deterioration of important stream elements:

- Water quantity,
- Water quality,
- Wildlife habitat,
- Recreational opportunities.

Water Quantity

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 of the Center for Watershed Protection (www.cwp.org) has collected studies from around the country measuring the effect of the amount 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 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.

Water Quality

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 the highest for discharges to Category One (C 1) streams, which include streams where trout breed and live (trout production and trout maintenance), and 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. State standards are less demanding for warmer waters that support other fish species.

Although much progress has been made in improving the quality of point source discharges (about 1,100 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.

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 data at: www.state.nj.us/dep/dwq/database.htm.

Pollution from Runoff – Nonpoint Sources

According to US 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.

ABBIE FAIR

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

Development Impact on Streams		
Development	**Impact**	
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	Changed natural stream flow that results in flooding and erosion
Adapted from *Surface Water and Riparian Areas in the Raritan River Basin* report from September 2002. Deborah Newcomb, primary author		

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 through direct contact with contaminated water and through consumption of shellfish. Sources include failing sewer or septic systems or animal waste.

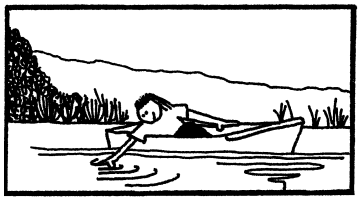
Toxic Contaminants include substances like heavy metals and pesticides. Because they resist breakdown and accumulate in organisms, they threaten the food chain. Sources include industrial, commercial, household and agricultural chemicals, and toxics from auto emissions.

Debris consists of various items of trash like old tires, shopping carts and plastics from illegal dumping and street litter. It 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.

Wildlife Habitat

Wildlife suffers from the effect of human 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.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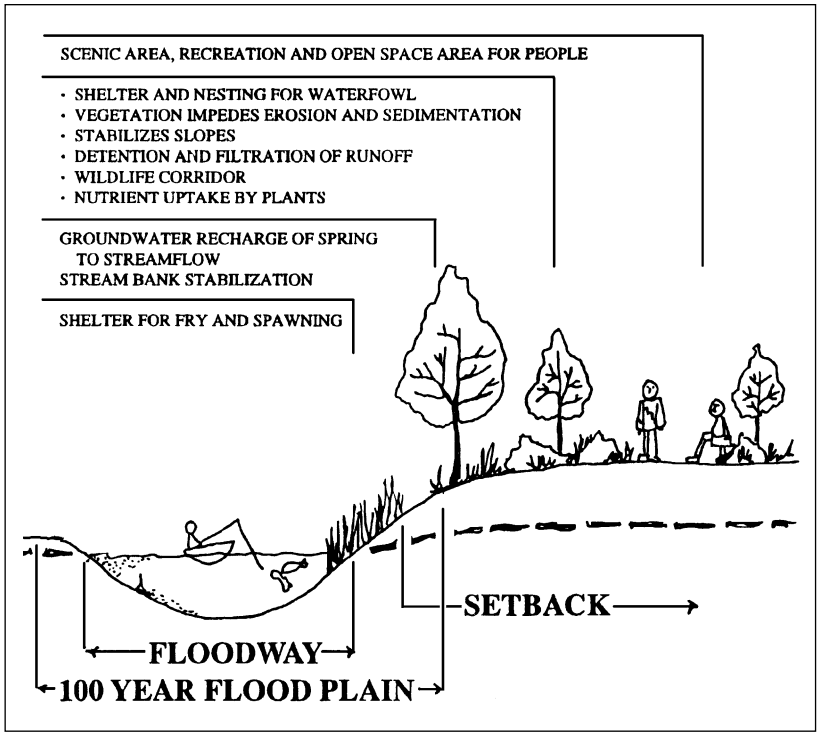
Recreational Opportunities

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.



Stream Corridor Functions

Options for Stream Protection

Mapping Stream Corridors

Mapping is the cornerstone of a Stream Corridor Protection Plan because it identifies the whole stream system. The environmental commission should map stream corridor preservation areas for inclusion in the Environmental Resources Inventory (ERI). When incorporated into the town's Master Plan, Greenway or Open Space Plan, this overlay map can become the basis of a stream protection plan. The town can pass an ordinance to provide adequate buffers and to guide subdivision, site plan, development review and make needed zoning changes. Programs can educate landowners about proper management of their environmentally sensitive streamside land and can encourage the voluntary donation of conservation easements.

In mapping stream corridors, commissions can use many data sources that should be available at the municipal planning department or county planning office.

- County Soil Conservation District maps identify wet soils, which are significant if they are within 50 feet of the top of the stream banks; *
- 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 maps show threatened and endangered species habitat. Available at www.njfishandwildlife.com, and link to Endangered and Non-Game Species.
- NJDEP Flood Prone Area maps show flood prone areas * (Also available on CDs from NJDEP Maps & Publications at 609-777-1038.)
- NJDEP land cover maps show land cover, important in locating impervious cover *

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

Important components of a Stream Corridor Protection Plan are field checking an inventory and mapping of headwaters of streams, including seeps and springs. These areas make a major contribution to water quality and are 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 NJ DEP stormwater regulations enacted in 2004 require a 300-foot riparian or stream corridor for all Category One streams. The Highlands Water Protection and Planning Act passed in 2004 also requires 300-foot buffers for all streams in the Highlands Preservation Area.

Streams that are not Category One also need protection. Environmental commissions should encourage their municipalities to pass stream corridor ordinances to protect the entire stream ecosystem. NJDEP has a model stream corridor

ordinance, which can be found at www.state.nj.us/dep/watershedmgt/rules.htm under Water Quality Management Planning Rule. It includes provisions for both Category One and non-category one streams. ANJEC also has several municipal stream corridor ordinances in its ordinance database that can provide guidance to interested towns.

The ordinance should require, as part of site plan and subdivision approval, that developers grant conservation easements on stream buffer areas, recorded on deeds in perpetuity. The town should also establish regular easement inspections to insure continued easement protection. In developed areas, the municipality may acquire buffer areas as part of a recreational 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.

Floating Buffers

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 environmentally sensitive areas including floodplains, wetlands, mature woodlands, steep slopes and 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.

Summary of Buffer Width Recommendations

Function	Buffer Width from Water's Edge (in feet)
Sediment Control	50 – 200
Streambank & Streambed Erosion Control	25 – 213
Nutrient and Pollutant Removal	150 – 300
Reservoir Protection	75 – 300
Stream Temperature Control	25 – 200
Aquatic Species	25 – 50
Wildlife Habitats	200 – 300

Source: *Watershed Management Strategies for New Jersey,* Cook College, Department of Environmental Resources, April 1989.

Examples of Ordinance Definitions of *Stream Corridor*

East Windsor (Mercer) **Holmdel (Monmouth)** **Lebanon Township (Hunterdon)**	Stream channel, 100-year floodline and a minimum of 100 feet from the flood line. If no floodline, 100-foot corridor is measured from the top of bank. The area of steep slopes greater than 15% abutting the outer boundary of the stream corridor.
Franklin Township (Somerset)	Stream channels, floodplains, contiguous slopes of 12% or greater whichever is the most restrictive.
Knowlton (Warren)	All channel areas, adjacent slopes of 12% or greater and contiguous areas where the depth of the seasonal high-water table is one foot or less.
Mendham Township (Morris)	Conservation easement required of 150 feet on either side from the centerline. For intermittent streams, a 50-foot easement from the centerline.

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 can determine changes in the stream over time. Macro-invertebrate sampling establishes longer-term water quality trends. It involves sampling the number and variety of macro-invertebrate species in streams. The more species that a stream has, the better the water quality. Watershed groups have made valuable contributions to accumulation of macro-invertebrate data around the state.

To insure that the monitoring efforts are productive, 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 (qa/qc) procedures that commissions or citizen groups should perform. 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 having a backup copy;
- Calibrating and keeping maintenance records for all field equipment.

Ordinances to Protect Streams

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' basic standards.

Stormwater Management

Buffers alone do not sufficiently protect streams from increased runoff and the pollution it brings. Engineers now use a variety of methods to control stormwater velocity and increase infiltration and groundwater recharge. NJDEP recommends use of non-structural methods, such as vegetative swales, dispersal of flow, low impact development and impervious cover restrictions. The NJDEP manual *Best Management Practices for Control of Nonpoint Source Pollution from Stormwater* describes a variety of techniques for nonstructural stormwater management (available on line at www.nj.gov/dep/stormwater/bmp_manual2.htm)

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, 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.

NJDEP 2004 regulations to implement Phase II EPA Stormwater Regulations address pollutants from storm drainage systems owned or operated by

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Stream Monitoring

municipalities, large public complexes and highway agencies. These entities must complete a Stormwater Management Program for their respective jurisdictions within five years with the following elements.

- 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

Benefits of Preserved Buffers and their Elements

Buffer Zones

- Protect the stream from excessive flow variations;
- Can 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 silvaculture and agriculture;
- Provide excellent 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 and 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.)

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 (leaks, overflows).
- Good housekeeping practices in public works yards and on municipal streets.
- Runoff control for construction sites of an acre or larger to control soil erosion and sedimentation.
- Runoff controls for new residential development and for redevelopment projects using a combination of structural and non-structural stormwater management devices and emphasizing use of infiltration, where possible.
- 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 and school systems have adopted IPM to reduce use of pesticides on town-owned land.

Erosion Control in Subdivision and Site Plan Review Ordinances

Several measures can 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 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 who has responsibility for monitoring 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.

Septic System Standards and Management

Municipalities may adopt septic system standards, subject to State review, which are more restrictive than those required by State regulations. Septic ordinances could require:

- Buffers of 100 feet between septic systems and water bodies to protect water from possible septic contamination. Current state regulations for on-site septic systems require a 25-foot setback for septic tanks from waterbodies and 50 feet for disposal fields.
- Regular inspection and maintenance of existing septic systems.
- Pumping septic tanks at regular intervals to improve septic system functioning and protect ground and surface water quality. The septic system's function is drastically limited if the tank is not properly maintained. 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. Grease and oils can clog vital tank components.

Other Local Ordinances

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

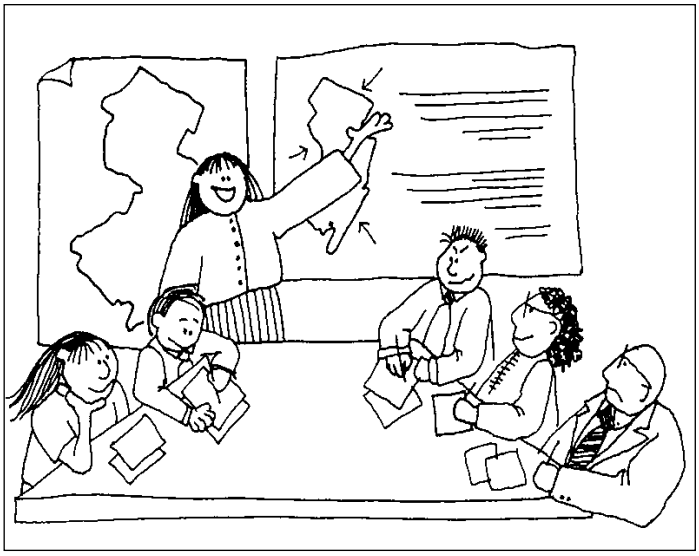
- Aquifer recharge ordinances control the uses on lands that provide recharge for groundwater supply.
- Clustering/open space ordinances allow development to be arranged on smaller than

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.
- Floodplain protection ordinances limit disturbance allowed in floodplains to protect stream buffers and prevent flood damage.
- Limestone protection offers special protections to groundwater in limestone areas.
- Noncontiguous development ordinances allow cluster development on noncontiguous lands under common ownership. For example, density can be concentrated on one parcel while the noncontiguous parcel remains preserved as open space.
- Shade tree protection ordinances regulate tree removal, set standards for replacement and reforestation.
- Soil removal and movement ordinances regulate disturbance, removal, or fill to minimize erosion, changes in grade, or importation of contaminated soil.
- Steep slope protection covers slopes over 15%, with prohibition of use on slopes above 25% 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 involvement in protection of local streams and rivers. These activities will also help towns comply with the state 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;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- Write "op eds" for your 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;
- Include stormwater runoff controls for commercial and industrial developments in your municipal stormwater ordinances;
- Work with elected officials to put ordinances in place that protect stream corridors and surface water quality.

State and Regional Regulatory Programs

Flood Hazard Areas

- *The Flood Hazard Area Control Act* is implemented by the Flood Hazard Area Regulations for Stream Encroachment Permits (N.J.A.C. 7:13–1.1 et seq.) 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.

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. Soil districts must review applications for stormwater controls for disturbances of an acre or more.

Water Pollution

- *Areawide Water Quality Management Plans and Wastewater Management Plans* address water pollution through wastewater facility planning and prevention of water pollution from stormwater runoff and other nonpoint sources. Designated planning agencies are counties (Sussex, Middlesex, Mercer, Ocean, Atlantic, Cape May), the NJDEP, or the Delaware Valley Regional Planning Commission. NJDEP permits must be consistent with these 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 NJ streams and their classifications, such as trout production, non-trout, estuarine, etc. For information: NJDEP, PO Box 029, Division of Water Quality , 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.
- 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.
- 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

- 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 NJ – the Upper and Middle Delaware, the Great Egg Harbor 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

Stream Corridor Resource List

Buffers and Streambanks

- *Keeping Our Garden State Green – A Local Government Guide for Greenway and Open Space Planning,* ANJEC, 1989.
- Native plants information and sources from Rutgers Extension Service, www.rce.rutgers.edu; enter "native plant sources" in search blank.
- *Riparian Forest Buffers: Function and Design for Protection and Enhancement of Water Resources,* David Welsch, US Forest Service. Available online at: www.na.fs.fed.us/spfo/pubs/n_resource/riparianforests/
- *Urban Stream Restoration Practices,* Center for Watershed Protection, Ellicott City, MD, 1995. Download from www.cwp.org/publicationstore/techresearch.htm

Education

- Nonpoint Education for Municipal Officials (NEMO) program. This educational resource for town boards and residents developed by the Connecticut Extension Service, provides illustrations and information about non-structural stormwater management. ANJEC has adapted this presentation for NJ municipalities. To schedule a presentation call ANJEC at 973-539-7547or info@anjec.org
- The NJ *Watershed Watch* program has information on how groups can "adopt" a local waterway for planning, plan a classroom program or develop a Watershed Watch program. NJ Watershed Watch Program, NJDEP, PO Box 418, Trenton, NJ 08625–0418. Phone 609-292-2113. www.state.nj.us/dep/watershedmgt/outreach_education.htm

Municipal Planning and Ordinances

- *A Cleaner Whippany Watershed. Nonpoint Source Pollution Control Guidance for Municipal Officials, Engineers and Dept. of Public Works.* NJDEP, Trenton, NJ, 2000.
- *Environmental Resource Inventory,* ANJEC Resource Paper, 2004.
- Municipal ordinances, ANJEC Resource Center, 973-539-7547 or email: resourcecenter@anjec.org.
- *Open Space Plan,* ANJEC Resource Paper, 2003.

Water Quality

- *Integrated Water Quality Monitoring and Assessment Report,* NJDEP, 2004. Available online at: www.state.nj.us/dep/wmm/sgwqt/wat/integratedlist/integratedlist2004.html
- *Water Quality Indicators Guide,* Natural Resources Conservation Service, 1989. Copies may be ordered by calling the Terrene Institute at 703-548-5473.

Internet Resources

- American Rivers – www.americanrivers.org
- ANJEC – www.anjec.org
- Center for Watershed Protection – www.cwp.org
- Riparian Buffer Internet Links – www.rce.rutgers.edu/njriparianforestbuffers/links.htm
- Rutgers Extension Service – www.rce.rutgers.edu
- Watershed groups – www.thewatershedinstitute.org
- Map Data – www.nj.gov/dep/gis/
- Threatened and Endangered Species – www.njfishandwildlife.com

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

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