

Section 319H Nonpoint Source Pollution Control and Management
Implementation Grant Program

RP01-114

Design and Implementation of Nonpoint Source Pollution Control
Measures in the Peapack Brook Subwatershed



Peapack Brook Subwatershed Landowners' Guide



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Division of Watershed Management
Bureau of Watershed Planning

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Introduction

Aquatic and terrestrial ecosystems are intimately connected, and the quality of a water resource directly correlates to surrounding land uses. Understanding this relationship, the threats that jeopardize the integrity of natural resources in our communities, and

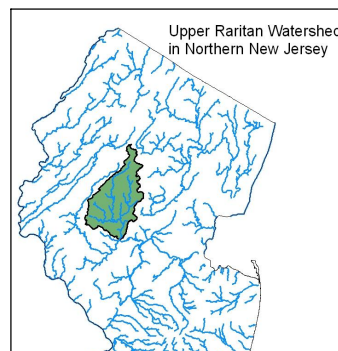


how degradation may be avoided is essential to preserving the quantity and quality of water available for both human and natural uses. The Upper Raritan Watershed Association, a 501 (c)(3) non-profit organization, has been working for decades to secure the environmental future of the Upper Raritan Watershed and has recently directed attention to the Peapack Brook subwatershed specifically due to the fact that this waterway is in danger of becoming impaired. This publication will help local community members to better understand watershed functions and offer guidance as to how individuals can take action to protect the natural resources on which we all depend.

What is a Watershed?

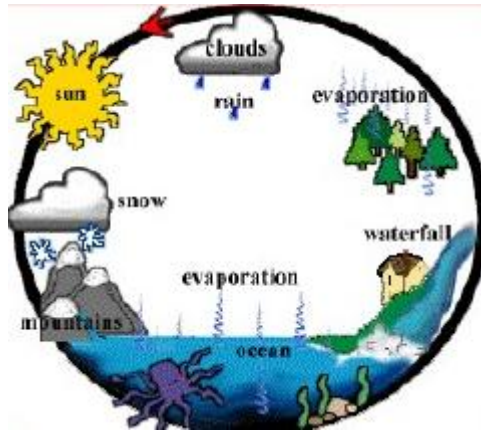
A watershed can be simply defined as an area of land that drains into a common body of water. Having such natural boundaries, watersheds often cross political borders and consist of many municipalities. Watersheds are further divided into units known as subwatersheds, which consist of drainage areas between 2 to 15 square miles and are associated with significant waterways within the greater watershed.

Located in the central northern part of New Jersey, the Upper Raritan Watershed consists of all lands that drain to the North Branch of the Raritan River. This 194 square mile area,



which provides clean drinking water for millions of New Jersey residents, contains 23 municipalities within Somerset, Hunterdon and Morris counties.

Importance of Watersheds



Many aspects of a watershed influence how water cycles through the environment. When precipitation occurs, water flows from the uplands section of a watershed, which is the higher land that surrounds a stream, however much of the water that falls each year never reaches the streams. It may evaporate or get absorbed by trees and other vegetation. Of the remainder, some flows across the surface of the land and collects in standing surface water, such as ponds or wetlands, on its way to the stream. Some infiltrates the soil and becomes groundwater, that which seeps through the surface and dwells deep within the ground between rock layers. Precipitation that is not captured in such ways is known as runoff which feeds streams and eventually flows into larger waterways downstream.

Natural landscapes reduce the amount of runoff that ever reaches a stream, however alterations of land use over time, in which urban cover has increased while forest cover has decreased, have significantly impacted the quantity and quality of runoff as well as groundwater recharge. Increased development and associated impervious surfaces, such as parking lots, sidewalks, and rooftops, have reduced the



amount of water that percolates into subterranean aquifers and consequently increased the amount of runoff that flows into streams.

Contaminants are collected by runoff as it crosses a variety of non-natural surfaces before entering a waterway. Water quality is degraded by non-point source pollution, that which arises from the fact that fertilizers, automobile oil, animal waste, and many other pollutants from a variety of sources are carried into local water bodies. Additionally, earth without a natural vegetative cover is susceptible to erosion; runoff carries soil and gravel into streams where it is deposited in flat, slow moving sections. This sedimentation, which buries or suffocates aquatic organisms, can eliminate pools and riffles that provide distinct aquatic habitat.

Naturally vegetated riparian areas, also known as riparian buffers, are those that surround a water body and offer defense against erosion, sedimentation, and pollution. In addition to the fact that the roots of vegetation stabilize soil amidst heavy rains or swirling floodwaters, these buffers function to protect water bodies



from impairment by filtering both excessive runoff as well as the contaminants it carries before the water reaches the resource. While riparian vegetation also shades waterways to prevent excessive warming which degrades aquatic habitats, riparian zones as well as the wetlands associated with the waterway can also accommodate significant increases in water flow during heavy rains and protect downstream areas from flooding.

The Upper Raritan Watershed Association

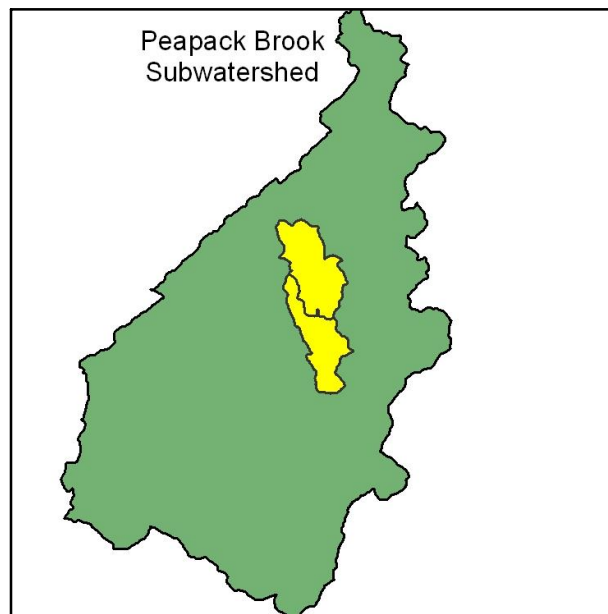
Due to current land use trends, the function of riparian areas has been compromised and flooding occurs consistently after storm events. Excessive runoff exacerbates erosion and

sedimentation throughout the watershed and transports pollutants into our waterways. The aquatic ecosystems on which we depend to sustain our way of life are not sufficiently protected. For 50 years, the Upper Raritan Watershed Association (URWA), headquartered in Bedminster, New Jersey, has partnered with non-profit, government, and private organizations in order to further conservation efforts. While improving aquatic systems in many ways, URWA has recently focused on the Peapack Brook subwatershed as it represents a significant resource suffering from non-point source pollution.

The Peapack Brook Subwatershed

Location and Significance of Peapack Brook

Peapack Brook, located in both the Highlands and Piedmont provinces of New Jersey, is a significant waterway that drains into the North Branch of the Raritan River. This trout production stream flows through the Borough of Chester, Chester Township, the Borough of Peapack-Gladstone, and Bedminster Township. Including its tributaries, Peapack Brook continues for 22 miles and encompasses a subwatershed drainage area



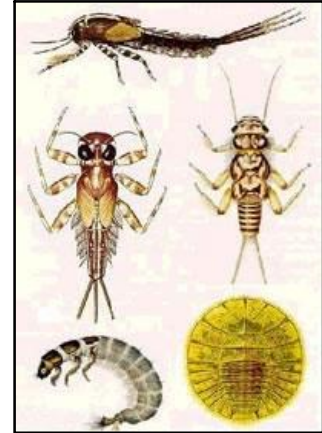
of 11.7 square miles, within which land use varies. The headwaters of the Brook originate at the Chester Springs Shopping Center in Chester Borough. Through Chester Township, the stream corridor and its tributaries are wooded, while the surrounding area supports residential development. As the Brook flows into Gladstone, it courses through open fields, including the grounds and athletic fields of the Gill St. Bernard's School, abandoned agricultural fields, and those used for active agricultural. While the stream flows through a commercial and residential area in Peapack and Gladstone, the Brook enters a wooded residential area once again in Bedminster where it meets the North Branch.

Evaluation of Stream Health

Stream health is evaluated using a stream monitoring system, including visual, biological, and chemical assessments.

- Biological Results

The relative richness and abundance of macroinvertebrate species in a stream community, collected in rocky bottom riffles, reflect the current quality of the environment at that site. All samples collected in 2002, 2003, 2004, and 2006 indicate that the Peapack Brook is “non-impaired”, however the nature of chemical parameters offers more insight into factors that jeopardize the future health of the subwatershed.



- Chemical Results

Although the pH of a water resource, which normally ranges between 6.5 and 8.5, is primarily determined by the geology of the watershed, contaminants can considerably alter the acidity or basicity of the stream and negatively impact the viability of biotic communities. While a variety of pollutants can also cause abnormally low dissolved oxygen readings, the amount of dissolved oxygen present in the stream is directly related to the temperature as warmer water fails to support high oxygen levels. Water temperatures should not exceed 20 degrees Celsius in order to support a healthy trout population.

Both Nitrate, an inorganic form of Nitrogen, and Phosphates are limiting factors to the productivity of aquatic ecosystems, however eutrophication, nutrient overloads and the resulting excessive plant growth and decomposition, leads to depletion of dissolved oxygen supplies. Land usage in the vicinity of water resources greatly affect the levels of phosphates and nitrates detected as domestic, industrial, and agricultural wastes, especially fertilizers, significantly contribute to nutrient contamination of waterways.

Just as runoff from adjacent lands can carry contaminants, such as additional phosphates and nitrates, into streams, it also contributes soils and sediments that increase the total suspended solids and turbidity of a waterway. Turbidity, the relative clarity of the resource, depends on the amount of matter suspended in the sample. Measuring the solids leads to a total suspended solids (TSS) result which should not exceed 25 mg/L according to regulatory standards. Excessive TSS degrades aquatic ecosystems in many ways. Suspended solids can clog fish gills, smother eggs, and suffocate larvae, while they also indirectly decrease dissolved oxygen since they absorb heat from the sun and increase water temperatures. TSS further reduces dissolved oxygen by preventing adequate light from reaching underwater vegetation and reducing photosynthesis. If the affected plants die, bacteria will consume even more oxygen during the decomposition process. Additionally, increased turbidity also exacerbates health risks as microorganisms, which are more abundant in soils than in water, attach to particles suspended in water.

In order to evaluate the sanitary quality of a resource, fecal coliform and total coliform analyses are performed. Regulatory standards require that water used for activities such as swimming, rafting, or kayaking must not exceed 200 organisms/100 ml. Adjacent land uses greatly influence water quality as animal waste, failing septic systems, and inadequate sewage treatment facilities can be sources of coliform bacteria in streams.

Considering the chemical monitoring data collected quarterly from December 2001 through July 2004, fecal coliform contamination is the most prevalent threat to water quality in the Peapack Brook. All sites sampled in December of 2001 had extremely high levels of fecal coliform with the lowest being about five times the maximum standard. In June 2002, six of the eight sample sites showed levels of fecal coliform exceeding the max standard of 200 MF/100 ml, and two of the sites surpassed the standard in October 2002. In January 2003, two of the samples exceeded the limit for fecal coliform, while only one resulted in high levels in March 2003. Again in June that year, four of the eight sites surpassed the safe levels of fecal coliform.

Aside from the coliform parameter, most samples met standards for water quality except for the following: In December 2001, results at site five indicated excessive TSS levels approximately four times the maximum standard, and the pH at site six slightly exceeded the limit for basicity in October 2002.

- NJDEP Evaluation

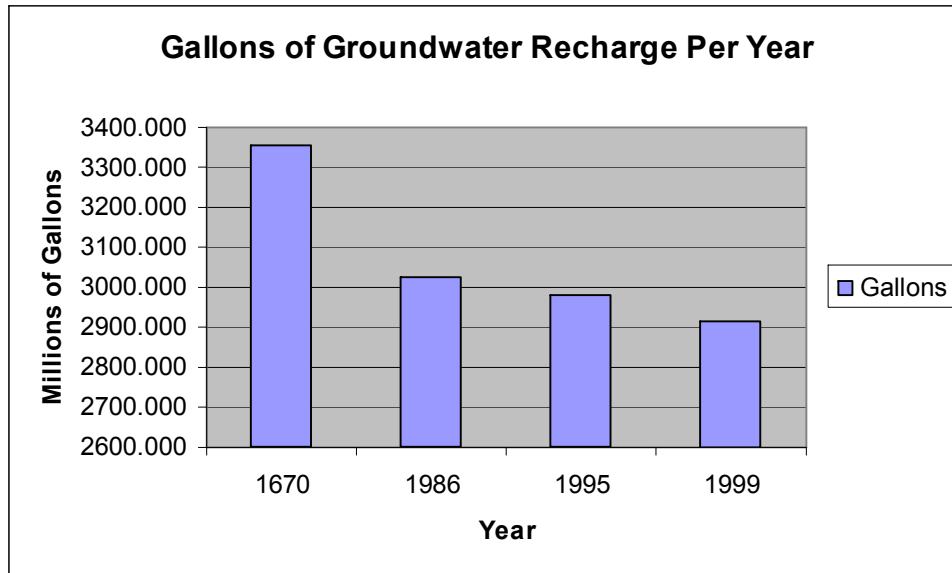
While the Peapack Brook is listed as non-impaired on the State 303d list of the Federal Clean Water Act, it is additionally classified by the New Jersey Department of Environmental Protection (NJDEP) as freshwater 2 “trout production, category 1” waters or FW2-TP (C1). Stream sampling for fish determined that the Peapack Brook has naturally reproduced trout in their first year of life, therefore giving it a trout production classification, and Category 1 designations are given to waterways with exceptional ecology, recreation, fisheries, or shellfish. Because of these exceptional values, waterways such as Peapack Brook deserve significant protection to prevent degradation.

The NJDEP has conducted biological monitoring studies of the state’s water bodies since the early 1970’s. They completed their initial macroinvertebrate survey for the Raritan Region in 1993-94. Macroinvertebrates are organisms that live some part of their life cycle in the water and can be seen with the naked eye. Macroinvertebrate communities are excellent pollution indicators due to the variability of tolerance levels between species.

Assessed during the first study round in 1994, the Peapack Brook was re-sampled in 1999, and no significant change in water quality was detected. Labeled as “non-impaired”, the Brook is a biologically diverse stream and supports a good representation of organisms intolerant to water pollution. This stream, however, is affected by non-point source pollution, including soil erosion, a lack of streamside vegetation, commercial and residential runoff, high nutrient levels, and degraded aquatic habitat.

- Impervious Surfaces

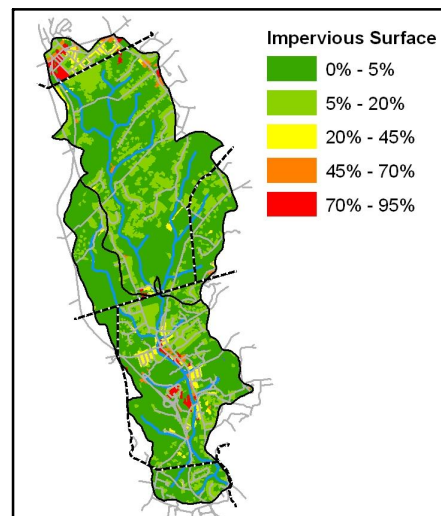
Impervious coverage, typically associated with development and urban land usage, has increased as the Peapack Brook subwatershed gained urban lands. Between 1995 and 2002, more than 147 acres of land were converted to impervious surfaces, which prevent absorption of water into the ground and increase stormwater run-off into nearby waterways.



Decline in Groundwater Recharge in Peapack Brook subwatershed

In addition to carrying contaminants into Peapack Brook, excessive flows exacerbate erosion of stream banks and sedimentation of the waterways which disrupt aquatic communities and degrades habitat. Increasing impervious cover has been correlated to declines in macroinvertebrate diversity as well as trout abundance and recruitment.

Studies have suggested that watershed functions become impaired and aquatic systems become stressed when impervious surfaces exceed 10% of the area. In the Peapack Brook subwatershed, impervious cover totaled approximately 9% in 2002. Considering recent land use trends, the subwatershed is likely to experience



impairment from the extent of impervious cover that exists at the present date.

- Riparian Buffers

In 2002, almost 47 acres of the riparian area were characterized by impervious cover. According to the trend analysis, the Peapack Brook subwatershed riparian area historically exceeded 1,644 acres, while only about 995 acres remained intact in 1995. Many areas of the Peapack Brook lack riparian buffer vegetation which exacerbates non-point source pollution in the stream and increases erosion along the banks.

- Erosion

Peapack Brook is considered a high gradient stream. This means that the stream has a steep slope and fast flowing water, conditions which result in high erodibility of the banks. Controlling erosion will help to slow down sedimentation and therefore protect the sensitive organisms, as well as trout populations, in the stream.

- Pet and Livestock Impact

Livestock with unrestricted access to the Peapack Brook exacerbate erosion as they trample the banks and stream bed. Additionally, animal waste from pets and livestock is a source of water pollution as it contains a high concentration of nutrients as well as pathogens and bacteria. Runoff carries the nutrients unable to be used by adjacent vegetation into the waterway and supports increased algal growth which eventually leads to lower oxygen levels in the water. Aquatic organisms may suffocate, but the water resource may also become unfit for recreational uses if the bacteria levels become higher than health standards permit. Chemical testing has detected high levels of fecal coliform which most likely followed storm events.

URWA's Efforts

319 Grant Restoration Projects

In the spring of 2001, the New Jersey Department of Environmental Protection Division of Watershed Management awarded URWA a 319h Grant, funded by the federal Clean Water Act (319), to reduce non-point source pollution and conduct restoration projects within the Peapack Brook subwatershed. In order to achieve these goals, URWA has partnered with the Natural Resources Conservation Service, the North Jersey Resource Conservation & Development Council, the Somerset-Union Soil Conservation District, Chester Township, the DEP Bureau of Freshwater Fisheries, and the Peapack-Gladstone Environmental Commission. A streambank stabilization project was initiated on a highly-eroded segment of Peapack Brook in Rockabye Meadow Park in the Borough of Peapack-Gladstone. Additionally, community volunteers participated in two reforestation projects within the Peapack Brook subwatershed. Trees were planted to create forested stream corridors which provide habitat for upland and aquatic wildlife, nutrient uptake, and stream bank stabilization.

Stream Monitoring

URWA annually trains volunteers to monitor water quality in Peapack Brook along with other sites in the Upper Raritan Watershed. Macroinvertebrate communities were sampled to evaluate biological indicators, while chemical and physical assessments offered insight into potential causes of impairment.

Community Outreach

In addition to educating local community groups to improve stewardship and environmental awareness, URWA staff works with local landowners to manage their properties and protect water resources. Contact URWA if you have questions or concerns about the environment where you live and work.



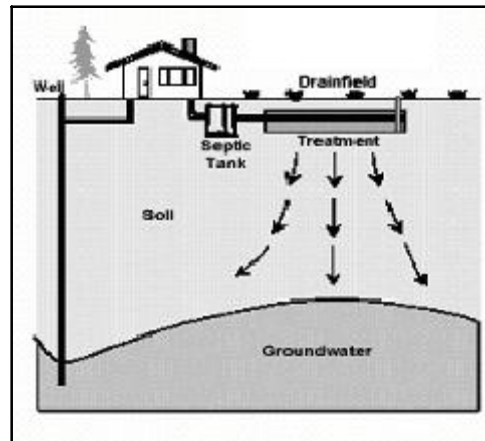
What you can do to help

Streams are healthiest in undisturbed countryside. As more people move into its watershed, the stream may show signs of stress. The amenities associated with human development, including houses, roads, lawns, and livestock, tend to generate increasing amounts of erosion and non-point source pollution, however by improving our understanding of the factors that endanger streams, we can learn to be good stream stewards. See additional information at www.urwa.org/education/education.html.

Responsible Septic Management

➤ How a Septic System Works

Septic systems have two main components including a septic tank and a subsurface disposal area. The tank receives wastewater and allows heavy solid particles to settle and light materials to float. Bacteria in the system help break down organic matter in the wastewater. The tanks should be sized according to the expected daily flow of wastewater from your home.



The subsurface disposal area generally consists of a distribution box and perforated distribution lines installed in subsurface gravel-filled trenches. The disposal area receives wastewater from the septic tank and removes harmful microorganisms, organic chemicals and nutrients. In order for this part of the system to function properly, it must be constructed carefully on suitable soil.

➤ Septic Suitability in the Peapack Brook Subwatershed

The suitability for a septic is determined by examining the detailed, site-specific soil profile and conducting permeability testing of the soil horizons. The type of system permitted on each soil is then based on the most limiting zone identified in the soil profile. The USDA

published soil surveys and maintains extensive data on the suitability of soils for various land uses. The Soil Survey of Somerset County has a table listing the degree and limitation of the soils for septic tank adsorption fields.

Soil factors that limit the adsorption fields in the Peapack Brook subwatershed include depth to bedrock, depth to groundwater, soil permeability, slope, and proximity to streams and other water bodies.

➤ Septic System Maintenance

They are some simple maintenance activities you can perform to keep your system functioning properly.

1. The system should be inspected and pumped out on a regular basis, every two to three years.
2. Know the locations of all parts of your septic system, the tank(s), distribution box, and distribution lines and keep heavy vehicles away from the system.
3. Direct drainage from roof, footing, and basement away from the disposal field.
4. Do not plant deep-rooted vegetation near the system, this could clog or crack the tank and piping.
5. Do not use the system to dispose of hazardous household chemicals, as this could destroy the helpful bacteria that break down the waste and could lead to groundwater contamination.
6. Do not use or install kitchen garbage disposals, as they add excessive solids and grease to the system.
7. Avoid using septic system additives. These biological and chemical additives usually do more harm than good.

Household Hazardous Products

Many products used commonly around the home are toxic to people and the environment. Some oven, drain, and spot cleaners, floor wax, and furniture polish are examples of potentially hazardous household products. The term “hazardous” means containing materials that are either toxic, flammable, volatile, corrosive, or could react with other substances to create hazardous materials.

➤ Alternatives

There are less expensive alternatives to using commercial cleaning products that are also safer for the environment and your septic system.

To Clean: ***Alternative:***

Carpets	To remove stains, promptly dab with a solution of vinegar and water. For odors and grease, mix 2 parts corn meal with 1 part borax, sprinkle, leave one hour and vacuum
Drains	Plunger, flush with boiling water, then ¼ cup baking soda & 2 oz. Vinegar and flush with boiling water again
Toilets	Toilet brush and baking soda; mild detergent
Greasy Hands	Baby oil, then soap
Furniture	1 part lemon juice, 2 parts olive or vegetable oil
Windows & Mirrors	Use 3 Tablespoons of vinegar with 1 quart warm water

<i>To:</i>	<i>Alternative:</i>
Make ammonia-based cleaners	Vinegar, salt & water mix for surfaces Baking soda & water for the bathroom
Make abrasive cleaners	Rub area with ½ lemon dipped in borax, rinse, dry
Make fabric softener	Add baking soda to final rinse
Make a laundry substitute for bleach	½ cup white vinegar or baking soda or borax
Make a disinfectant	½ cup borax in 1 gallon of water
Repel fleas	Add brewer's yeast to pet food
Deodorize	Use potpourri, candles, cedar shavings

➤ Disposal of Chemicals

1. Never dump household chemicals or other pollutants down storm drains. This water flows directly into local waterbodies without being treated.
2. Bring chemicals and leftover paints to Household Hazardous Waste Collection days. Call your municipal office for details.
3. Bring used motor oil to a recycling center and perform regular maintenance on your vehicle to prevent leakage of pollutants that will contaminate runoff.
4. Avoid washing cars with conventional cleaning agents in driveways where the run-off is not treated. Take vehicles to a car wash that disposes of the wastewater into a sewer system that will treat it before it is released into the environment.
5. If you have a septic system, make sure products are “suitable for septic system” before pouring them down the drain.

Storage Tanks

Many residents in the Peapack Brook subwatershed use underground or aboveground storage tanks for home heating oil. These tanks are a potential source of ground and surface water pollution, while home heating oil is also known to contain several carcinogens.

- Leaking Tanks

Leaks from tanks can result from defects in tank material, improper fittings, improper installation, damage during installation, corrosion or mechanical failure of the pipes and fittings, and tanks that are improperly abandoned or removed.

Leaking tanks pose a serious threat to ground water supplies. Problems from leaking tanks can include surface water contamination, surface and subsurface soil contamination, and property damage, including seepage into buildings and damage to underground utilities.

Tank owners are required to report and clean up a discharge regardless of the quantity released. It should be reported to the local fire department, health department, and the NJDEP Hotline at (877) WARN DEP.

- Proper Construction and Installation

Proper construction reduces owner liability and threats to ground and surface waters. All tanks, regulated or unregulated, must comply with local building, fire, and zoning ordinances. Materials used for tanks should be corrosion-proof, such as fiberglass, reinforced plastic, or steel wrapped with polyethylene. Steel tanks can also be purchased with corrosion protection for the tank and piping. Double-walled tanks and piping can provide added protection.

- Leak Detection

Some signs of a leaking tank are obvious and include the following: unusual amounts of water in the tank, unusual odors, petroleum products in basements, malfunctioning heating systems, dead or dying vegetation near the tank and an unusual increase in fuel usage. It is recommended that homeowners have a tank tightness test performed upon tank installation and periodically afterwards. Early leak detection is a tank owner's best protection against a costly cleanup.

Buffer Zones

The best protection for a stream is to be surrounded with a good buffer area of woods, shrubs, wetlands, and grasses to intercept contaminated runoff before it reaches the water. The less “groomed” this buffer area is, the more it can perform its normal functions, which include:

- Protecting banks from erosion
- Storing water and filtering it to ground water
- Removing sediment and excess nutrients
- Shading and cooling the stream
- Providing organic debris for the stream’s food chain
- Filtering out pollutants

Protect stream banks on your property:

- Ideally the buffers should consist of a variety of plants and extend for *a minimum* of 25 feet on each side of the stream depending on the soils and slope. Steep-banked streams, such as the Peapack Brook, require the hearty protection of shrubs and trees that provide shade, erosion control, temperature regulation and food sources for aquatic wildlife.
- Refrain from applying chemicals in this area to avoid polluting the waterway.
- A tree that falls into the stream provides cover and shade for fish and other stream inhabitants. Natural dams of branches and twigs capture organic debris and provide a rich feeding area for aquatic creatures, however snags and blockages that cause dangerous flooding or erosion may have to be cleared.
- Refrain from destructive activities, such as the use of heavy equipment, in the riparian area.

- Clean up human-derived debris that is caught within the vegetation before it enters the stream.
- Discuss stream buffer management and available funding for such programs with URWA.

Pasture and Lawn Management

- Being “earth-friendly” when caring for your lawn and yard may also save time and money
1. If you want to try something new, think about replacing your lawn with an alternative ground cover. Some suggestions are clover, purple leaf wintercreeper, periwinkle, lily of the valley, bugleweed, birdsfoot trefoil, bearberry, wineleaf cinquefoil, and pachysandra. These alternatives provide the functions of a natural landscape and require less maintenance than exotic grasses planted in traditional lawns.
 2. Test your soil for pH. Lawns like a neutral pH for growth (pH between 6 and 7) because this condition increases the nutrient availability. If the pH is lower than 6.4, apply lime to the lawn. One lime application will last for several years.
 3. Mow the lawn to about two and a half to three and a half inches. Cutting too short results in decreased root growth. More roots mean more water is absorbed and runoff is reduced. Do not mow to the stream edge. Leave a buffer zone of at least 25 feet on each side of the stream to protect the resource.
 4. Reduce the need to water lawns. Mulching garden beds and around trees helps them to retain water. Water only on non-windy days and early in the morning or in the evening when evaporation is lowest.
 5. Leave the clippings on the lawn, as they are a source of nitrogen for the grass. If you do not want to leave the clippings, consider starting a compost pile. The grass clippings make a great addition to compost, along with kitchen vegetable waste and leaves.
 6. DO NOT DUMP CLIPPINGS INTO THE STREAM! This increases nutrient levels in the stream, which may cause algal blooms and eutrophication as mentioned earlier.

7. If you use a lawn-care service, be sure to inform them of the decisions you make regarding lawn care.

- Fertilizers

Nutrients (nitrogen, phosphorus and potassium) are required for plant survival. If nutrients are unavailable from the environment, fertilizers can be a helpful additive, however, fertilizers are often applied needlessly or over-abundantly.

1. Using compost to fertilize vegetable and flower gardens is a great alternative. You can easily start a compost pile using grass clippings, leaves, and kitchen vegetable waste. The decomposed mulch created from these ingredients helps to replenish the nutrient levels of soil and is completely natural.

2. Have your soil tested to determine the precise amount of nutrients needed to augment the natural levels available in the soil (contact Rutgers Extension).

3. Know the size of the area you will be fertilizing to help you determine the appropriate fertilizer amount.

4. Set your spreader to empty the correct amount of fertilizer.

5. Look for fertilizers certified as organic, and read all instructions, ingredients and safety information before beginning any application.

6. Do not spread fertilizers if rain or wind is forecasted. You want them to stay on your lawn, not go in the air or water.

- Pesticides

Although effective at getting rid of backyard pests, most pesticides are toxic to humans, animals, and aquatic organisms. Consider alternative methods of pest control, including insect predator species, that do not pose such hazards.

Naturally Pest-Resistant Plants	Resistant to the Following Pests
Mint	Ants, aphids, cabbage worms
Marigold	Beetles, nematodes, squash bug, thrips, tomato hornworm, whitefly
Rosemary	Cabbage worms, slugs
Garlic	Aphids, beetles, spider mites, borers
Onion	Beetles, mice, spider mites, borers
Nasturtium	Potato bugs, squash bugs, whitefly

- Reduce Impervious Surfaces

Instead of paving driveways and patios, use a network of pavers so that water can infiltrate the soil in between each block. Another alternative to impervious outdoor surfaces is the installation of wood decks which allow rainfall to seep into the ground below.

Pet and Livestock Wastes

- If you own livestock, store and dispose of manure properly. Piles should be placed where storm runoff will not wash waste material into the stream. Like any fertilizer, manure should not be spread on farm fields or gardens during wet seasons when the soil is saturated, particularly if the area drains into a stream or wetland.
- Install fencing that allows a buffer along waterways and prevents your pets or livestock from walking in the stream as this will contribute to streambank erosion. You can contact your local office of the Rutgers Cooperative Extension or Soil Conservation District for additional technical information and for assistance in formulating a Farm Conservation Plan. (See page 30).
- Do not feed wild ducks and other waterfowl. This can result in overpopulation and subsequently excessive nutrients in the waterways.
- Dispose of pet waste in trash receptacles or toilets to prevent additional non-point source pollution in your watershed.

Invasive Species Control

An exotic plant is a species that has been introduced into a new environment. Not all exotic plants are invasive, those whose population begins to grow to the extent that they displace species that normally exist in that environment. Plants that are both exotic and invasive pose a major threat to biodiversity throughout NJ. In fact, they are the second greatest threat to biodiversity worldwide, second only to loss of habitat.

Invasive species have an extremely aggressive growth pattern, often forming dense stands or carpets, and out-compete native plants on which wildlife rely for food and shelter. They are often found to chemically alter soil properties in their favor, which further decimates native plant and animal populations. People are often unaware that these plants are not indigenous to our area, let alone threatening our native ecosystems. To compound the problem, many nurseries are still selling invasive plants. For these reasons, it is important not to plant these species in your yard or garden. If you already have any of these plants growing on your property, we encourage you to remove them and plant natives in their place.

When choosing plants to landscape an area, native plants, which are readily available at most nurseries, should be chosen over non-native and invasive types. As a general rule, any plant described as Japanese, Oriental, English, etc. is obviously not native to North America and should be avoided. Whenever available, the native variety of a plant should be utilized. For instance, instead of planting the introduced Kousa dogwood (*Cornus kousa*), consider the wide selection of native dogwoods such as flowering (*Cornus florida*) or alternate leaf (*Cornus alterniflora*). Native plants are equally as beautiful in a landscape, with the added benefit that birds, butterflies and other wildlife will become frequent visitors to your yard.

See Appendix I. for a list of the most common invasive species found in local landscapes as well as suggestions for native alternatives.

Land Preservation

If you do not already have a conservation easement established on your property, consider land preservation options that will protect lands in the Upper Raritan Watershed from inappropriate use. By donating a conservation easement, a landowner is entitled to many tax benefits, including federal income tax deductions, reductions in capital gains and estate taxes, and under some circumstances, reduction in local property taxes. A conservation easement, which may pertain to all or a portion of the property, is a legal contract that extinguishes development rights on a parcel in perpetuity while allowing the landowner to reserve specific rights, such as equestrian use and a future house site. A conservation easement differs from a simple deed restriction because another entity, the easement holder, is responsible for ensuring compliance with the contract which is binding to all future owners of the parcel. Contact URWA for more information about land preservation opportunities.

References

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2. New Jersey Natural Heritage Database, Somerset County - Rare Species and Natural Communities presently recorded, March 11, 1997.
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20. Soil Health Restoration, Chris Smith, Soil Scientist, USDA - NRCS, January 1997.
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22. Ground Water Protection Practices for Septic Systems, NJDEP, June 1992.

APPENDIX I. Invasive and Native Species

Invasive trees and plants		Native trees and plants	
Norway Maple	<i>Acer platanoides</i>	Sugar Maple	<i>Acer saccharum</i>
Black locust	<i>Robinia pseudoaccacia</i>	Red Maple	<i>Acer rubrum</i>
Tree of heaven	<i>Ailanthus altissima</i>	Oaks	<i>Quercus sp.</i>
Princess tree	<i>Pawlonia tomentosa</i>	Black gum	<i>Nyssa sylvatica</i>
Japanese barberry	<i>Berberis thunbergii</i>	River birch	<i>Betula nigra</i>
Burning bush	<i>Euonymus alatus</i>	Sycamore	<i>Platanus occidentalis</i>
Chinese privet	<i>Lingustrum vulgare</i>	Bottlebrush buckeye	<i>Aesculus parvifolia</i>
Autumn olive	<i>Eleagnus umbellata</i>	Flowering dogwood	<i>Cornus florida</i>
Japanese spirea	<i>Spirea japonica</i>	Redosier dogwood	<i>Cornus sericea</i>
Japanese wisteria	<i>Wisteria floribunda</i>	Witchhazel	<i>Hammamelis virginiana</i>
Oriental bittersweet	<i>Celastrus orbiculatus</i>	Winterberry holly	<i>Ilex verticillata</i>
Multiflora rose	<i>Rosa multiflora</i>	Rhododendron	<i>Rhododendron maximum</i>
Periwinkle	<i>Vinca major or minor</i>	Virginia creeper	<i>Parthenocissus quinquefolia</i>
Bush honeysuckle	<i>Lonicera sp.</i>	Viburnum	<i>Viburnum sp.</i>



Multiflora Rose



Japanese Barberry

For more comprehensive lists and pictures, visit www.ma-eppc.org or www.nps.gov/plants/alien.

Appendix II. Landowner Incentive Programs

Partners for Wildlife

Partners for Wildlife is a national program implemented by the U.S. Fish and Wildlife Service to protect and restore important fish and wildlife habitats on private lands through partnerships. Since its beginning in 1991, the program has focused on wetland restorations, but has recently grown to include upland and riparian restorations. This voluntary, cost-share program builds upon the strengths and diversity of committed individuals and organizations to accomplish conservation goals.

Program goals include the following: restoring wetlands using partnerships with State and other agencies, restoring and protecting for federally listed endangered and threatened species and migratory birds and fish, contributing to biological diversity on private lands, particularly those with permanent conservation easements; contributing to the biological diversity of National Wildlife Refuges by conserving and restoring supporting ecosystems, and restoring habitat through voluntary partnerships with private landowners.

If a project qualifies for the program, the Fish and Wildlife Service provides project plans, recommendations, assistance with implementation, and funds, however landowners are required to sign an agreement to maintain a restored site for at least 10 years.

Wetlands Reserve Program

The Wetlands Reserve Program (WRP) offers landowners a chance to receive payments for restoring and protecting wetlands on their property. The program provides a unique opportunity for farmers to retire marginal agricultural lands and reap the benefits of having wetlands on their property.

The WRP Program obtains conservation easements from participating landowners and provides cost-share payments for wetland restoration. The amount of the cost-share is

dependent on the length of the easement, whether it is permanent, 30 years, or a 10-year agreement.

If the property is selected under this program, the Natural Resource Conservation Service (NRCS) and the Fish and Wildlife Service jointly help landowners develop a Wetlands Reserve Plan of Operations. Each plan describes intentions and objectives of the restoration, acceptable practices during and after the restoration, and landowner requirements.

Conservation Reserve Program

The Conservation Reserve Program (CRP) is another voluntary federal program that offers annual rental payments and cost-share assistance to establish long-term resource-conserving covers on eligible land. Rental payments are based on the agricultural rental value of the land, and cost-share assistance provides up to 50 percent of the participant's costs in establishing approved practices. The contract duration is from 10 to 15 years, and the rental payments can be applied as income received on farmland assessed properties.

Among other conditions, eligible land must have been planted two of the five most recent years or be marginal pasture that is suitable for use as a riparian buffer. Environmentally sensitive areas are targeted for assistance.

Wildlife Habitat Improvement Program

The Wildlife Habitat Improvement Program (WHIP) is a voluntary federal program designed for people who want to develop and improve fish and wildlife habitat. Participants agree to implement a Wildlife Habitat Development Plan. The NRCS provides technical and financial assistance for the initial establishment of wildlife habitat development practices. State wildlife agencies and URWA may also provide additional expertise and funding for project completion.

Like the other plans, participants enter into a cost-share agreement, which generally lasts a minimum of 10 years, and a Wildlife Habitat Development Plan is prepared. The landowner agrees to maintain cost-shared practices and permit access to monitor the effectiveness of the practices. The NRCS agrees to provide technical assistance and pay up to 75 percent of the costs.

Forest Stewardship and Stewardship Incentive Program

The Forest Stewardship Program (FSP) is a forest management oriented program offering private woodland owners with written guidance and financial assistance. The program goals are to protect and improve the timber, wildlife, soils, water, recreation and aesthetic values of forests. New Jersey administers this federal program through the New Jersey Forest Stewardship Committee. Private woodland owners who have between five and 1,000 acres are eligible for enrollment.

- Forest Stewardship Plan

The goal of the FSP is to provide landowners with written Forest Stewardship Management Plans that outline management activities based on a landowner's objectives. Landowners can obtain technical and financial assistance to develop a management plan, and landowners enroll by submitting this plan to their regional forester. Existing forest management plans under the farmland assessment program may only need minor enhancements to also qualify for the FSP.

- Stewardship Incentive Program

The Stewardship Incentive Program (SIP) is a companion program designed to provide financial assistance to FSP-participating landowners. Enrolled landowners are eligible to receive up to 75% cost-sharing to implement practices outlined in their Forest Stewardship Management Plan.

Appendix III. Local Resources

Upper Raritan Watershed Association www.urwa.org

P.O. Box 273
Gladstone, NJ 07934
(908) 234-1852

Location:
2121 Larger Cross Road
Bedminster, NJ

Rutgers Cooperative Extension Offices www.rcrc.rutgers.edu/county/

Somerset County
310 Milltown Road
Bridgewater, NJ 08807
(908) 526-6293

Morris County
P.O. Box 900
Morristown, NJ 07960
(973) 285-8300

U.S. Fish and Wildlife Service www.fws.gov

New Jersey Field Office: (609) 646-9310

U.S. Department of Agriculture Natural Resource Conservation Service

www.nrcs.usda.gov

Somerset County District
8 Gauntt Place
Flemington, NJ 08822
(908) 782-4614 x3

Morris County District
560 West Hanover Ave.
Morristown, NJ 07963
(908) 852-2576 x3

State Soil Conservation Districts

www.nj.gov/agriculture/divisions/anr/nrc/conservdistricts.html

Somerset County District
308 Milltown Rd
Bridgewater, NJ 08807
(908) 526-2701

Morris County District
560 West Hanover Ave.
Morristown, NJ 07963
(973) 285-2953

New Jersey Department of Environmental Protection www.state.nj.us.gov/dep/

Environmental Action Hotline	(877) 927-6337
Bureau of Flood Plain Management:	(609) 292-2296
Bureau of Freshwater Fisheries:	(609) 292-8642
Office of Natural Lands Management	(609) 984-1339
Bureau of Watershed Planning	(609) 984-5044
Land Use Regulation, Stream Encroachment	(609) 292-0060