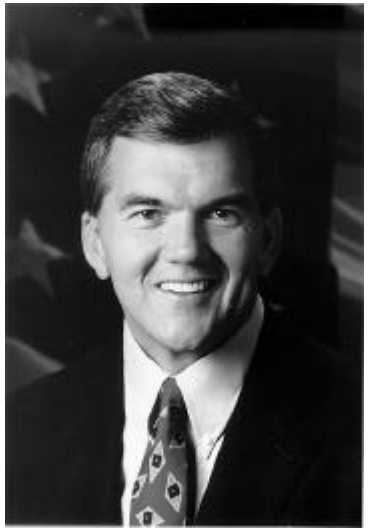
Credits

More than 100 individuals and representatives of groups from throughout Pennsylvania met from May through November, 1997 to contribute their experiences, ideas and advice for this plan. Participants represented a wide range of interests, including development, education, agriculture, local government, natural resource management, watershed advocacy, hunting and fishing, business, philanthropic, and state and federal government. The following individuals chaired monthly committee meetings: Cindy Adams Dunn, Pennsylvania Director of National Audubon (education and outreach committee); Janet Oertly, State Conservationist with the USDA Natural Resources Conservation Service (restoration strategy committee); Charlotte Sprenkle, Lancaster County Conservation District (conservation strategy committee); Paul Swartz, Executive Director, Susquehanna River Basin Commission (reporting and evaluation committee); and Chris Novak and Gretchen Leslie (co-chairs), DEP and DCNR respectively (public relations committee). The Pennsylvania Department of Conservation and Natural Resources (DCNR) and other state agencies have guided the Pennsylvania Department of Environmental Protection (DEP) in helping these groups develop the basis for the plan. DEP's Bureau of Watershed Conservation staff compiled and summarized results from the many committee meetings into this report. Graphics are by Steve Ebersole and Brian Wadas, DEP (cover).

Science students from Lower Dauphin Middle School plant a streamside buffer at an industrial site along the Swatara Creek. In addition to the school and the industry, project partners included the watershed association, the county conservation district, the utility companies in whose right-of-way the planting occurred, the county parks and recreation department, DCNR, and DEP.
(Photographer - Patricia Pingel, DEP)



William Penn arrived at his American land grant in 1682 to find a forested countryside with abundant clean streams and lakes. His generation, and many that followed, saw Pennsylvania's woodlands and waters as endless resources -- valuable for building a new country. Three centuries elapsed before we began to truly understand the link between the quantity and quality of our waters and forested shorelines.

In 1996, I joined the governors of Maryland and Virginia; the mayor of Washington, D.C.; and the U.S. Environmental Protection Agency in agreeing to restore 2,010 miles of forested stream buffer in the Chesapeake Bay watershed by the year 2010, and to conserve existing buffers. We now are extending this important voluntary initiative to include all of Pennsylvania's streambanks and shorelines, where buffers are feasible.

People from across Pennsylvania have responded enthusiastically to this challenge. Volunteers from many groups and agencies have met to recommend how we can cooperatively reach these goals. Their ideas formed our Pennsylvania Stream ReLeaf plan.

Planting trees and watching them grow has universal appeal. Everyone from school children to retirees can participate. We all can gain valuable lessons about our environment, while helping to improve our own neighborhood streams.

Pennsylvania Stream ReLeaf will happen community by community because of the dedication, enthusiasm and creativity of our citizens. State agencies stand ready to provide assistance where needed.

Please help us enter the 21st century with a new appreciation for our own Penn's Woods and streams.

Tom Ridge

TOM RIDGE
Governor

Stream REALEAF®
Replanting Pennsylvania's Streamsides

PENNSYLVANIA STREAM RELEAF
A Plan for Restoring and Conserving Buffers Along Pennsylvania Streams

Table of Contents

A range of streamside buffer conditions occurs adjacent to mixed land uses along this stretch of the Maiden Creek near Berkley, Berks County. (photographer - Patricia Pingel, DEP).

INTRODUCTION AND BACKGROUND

A Vision for Pennsylvania's Streams, Lakes and Ponds

The first European settlers of Penn's Woods found just that – mostly woodland. Streams flowed through forest. Lakes and ponds were surrounded by it. As settlement continued, most of Pennsylvania's woods were cleared at least once for the timber they provided, and to make way for farming, industry and housing. The effects of this on Pennsylvania's streams were described in 1753: "Our runs dry up apace; several which formerly would turn a fulling mill are now scarce sufficient for the use of a farm. The reason of the which is this, when the country was covered with woods and the swamp with brush, the rain that fell was detained by these interruptions and so had time to insinuate into the earth and contribute to the springs and runs. But now the country is clear'd, the rain as fast as it falls is hurried into the rivers and washes away the earth and soil of our naked fields, fills and choaks the springs, and makes shoals and sandbanks in our creeks and rivers; and hence several creeks mentioned by Mr. Penn to be navigable are no longer so" (quotation from "Pennsylvania Agriculture and County Life 1640-1840" as cited in Delaware Estuary Program Report #94-03). By 1895, more than two-thirds of Pennsylvania's 27 million acres of forests had been cleared (*The Legacy of Penn's Woods* by Lester A. DeCoster).

To understand how forest affects streams, we need only do a simple comparison. Streams now surrounded by second growth forest run clear, even after heavy rains, and have stable banks. Contrast this with the usual appearance of streams in areas not now forested. They often run brown with silt, and have eroding banks. We have grown up thinking that muddy, turbid streams are natural and normal. In reality, the sediment and its pollutants create very real problems and costs.

The riparian (streamside) buffer initiative is a practical step toward reclaiming Pennsylvania's waterways. This plan is intended to serve as a guide for anyone who wants to protect or improve water quality and enhance stream corridors in their own communities. By establishing and maintaining streamside buffers, communities, schools, citizens' groups, landowners and agencies will work with waterways and their natural resources to protect their quality for the benefit of all Pennsylvanians and Pennsylvania's environment.

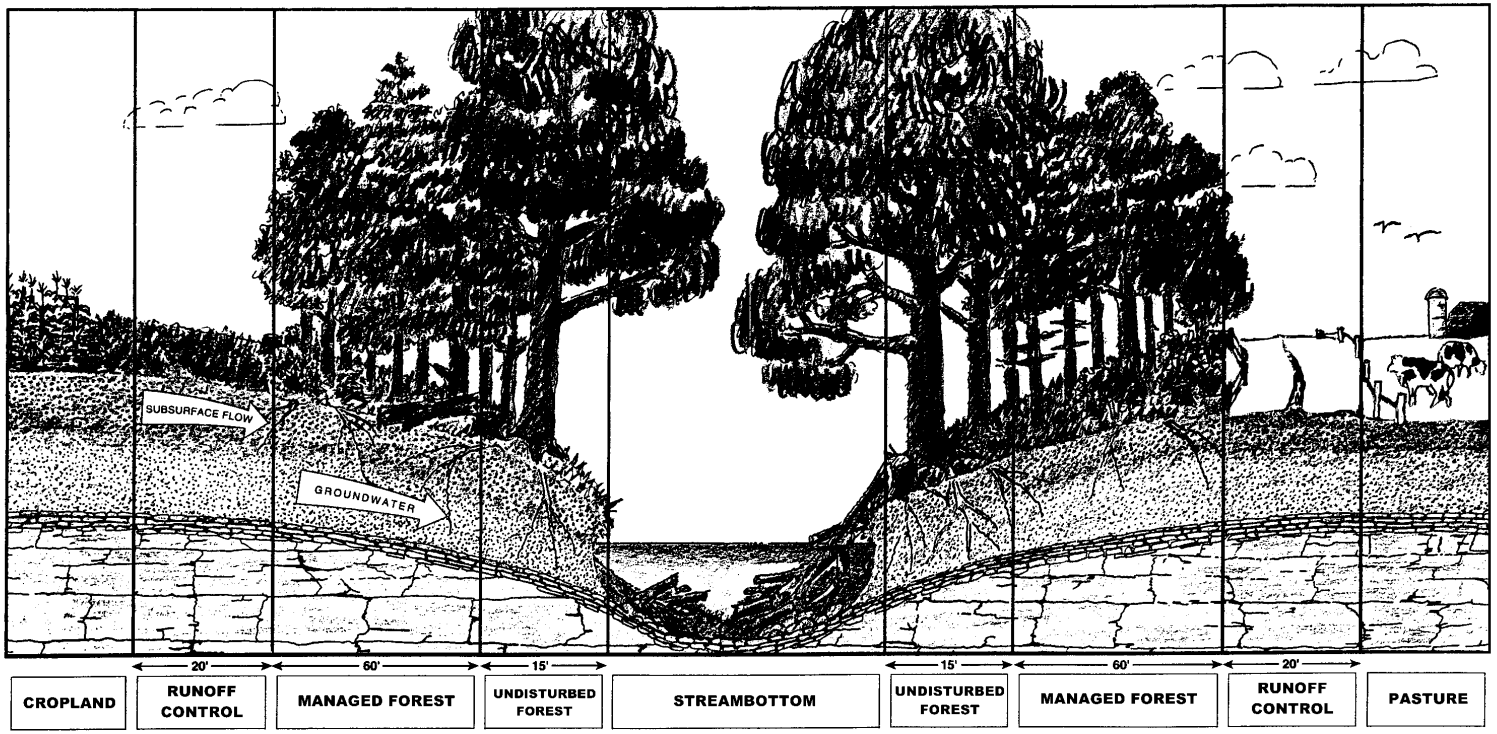
What is a Riparian Buffer?

A riparian buffer is an area of vegetation that is maintained along the shore of a water body to protect stream water quality and stabilize stream channels and banks. Buffers can reduce the pollutants entering a stream, lake or pond by filtering and altering the form of sediments, nutrients and other chemicals in runoff from surrounding lands. Streamside buffers also provide food, habitat and protection from extreme temperatures for fish and wildlife. Forested buffers of mostly trees and shrubs that are at least 100 feet wide perform these functions best *(Chesapeake Bay Riparian Handbook)*. Narrower forest and shrub buffers, as well as properly designed grass buffers, may also provide degrees of benefit.

Why Streamside Buffers?

Streamside areas link water to land. Some of their many functions are essential for human health and welfare, some are highly desirable for recreation and scenic values, and some are

THE STREAMSIDE FOREST BUFFER



From: Chesapeake Bay Riparian Handbook

Stream REALEAF® Replanting Pennsylvania's Streamsides

important for maintaining the natural stream (lake, pond) system. Streamside buffers protect human health and welfare by protecting water supplies, by providing areas that store and slow flood waters and by stabilizing stream banks. They often create economic advantages through increased property values, better herd health for pastured animals and low maintenance requirements once established. Landowners who conserve buffers on their properties may be eligible for financial benefits through easement programs. Streamside buffers improve water quality, enhance fisheries and wildlife habitat and help to protect the physical and hydrological functions of water bodies.

Streamside forests provide the following benefits for water bodies and wildlife:

- filter runoff – Rain that runs off the land can be slowed and infiltrated in the forest, settling out sediment, nutrients and pesticides (nonpoint source pollution) before they reach streams. Infiltration rates 10-15 times higher than grass turf and 40 times higher than a plowed field are common in forested areas.
- take up nutrients – Fertilizers and other pollutants that originate on the upslope land are taken up by tree roots. Nutrients are stored in leaves, limbs and roots instead of reaching the stream. Through a process called "denitrification", bacteria in the forest floor convert nitrate to nitrogen gas, which is released into the air.
- provide shade – The leaf canopy's shade keeps the water cool, allowing it to retain more dissolved oxygen, and encouraging growth of plants and aquatic insects that provide food for fish.
- contribute leaf food – Leaves that fall into the stream are trapped on fallen trees and rocks where they provide food and habitat for organisms critical to the aquatic food chain.
- provide habitat – Streams that travel through woodlands provide more habitat for fish and wildlife. Woody debris provides cover for fish while stabilizing stream bottoms (Chesapeake Bay Program, 1996).
- provide migration corridors for wildlife.

Streamside buffers provide additional benefits to landowners and the larger community by:

- safeguarding water supplies by protecting groundwater recharge areas.
- providing flood control.
- providing stormwater management potential – natural vegetation provides a basis for innovative stormwater management systems. Stormwater flows from retention basins can be directed to, and allowed to flow through, forested buffers to reduce nutrient and sediment loads.
- improving the health of cities, boroughs and townships by improving water and air quality.
- stimulating economic opportunities such as by providing valuable open space which may increase land values and, therefore, the tax base.
- providing some federal tax incentives to landowners (depending on a landowner's financial situation) willing and able to place some of their lands under conservation easement.
- effecting cost savings by reducing grounds maintenance.

- providing recreational opportunities, and associated economic benefits for recreation- related businesses.
- providing educational and research opportunities for local schools and colleges.
- providing windbreak, shade and visual buffer.

Communities can benefit substantially from community forestry projects. The Northeastern Pennsylvania Community Forestry Program has completed greenway and forest enhancement projects in the Scranton, Pennsylvania area. An economic impact study of Steamtown National Historic Site, which includes forestry projects, forecasts an economic return of from 1.2 to 2.8 times expenditures.

Pennsylvania's Initiative is Twofold: Chesapeake Bay & Statewide

The governors of Pennsylvania, Maryland and Virginia and the Mayor of Washington, D.C., recognized the importance of streamside buffers to the region by signing a Chesapeake Bay Program directive in 1994. In a 1996 Adoption Statement, they agreed to restore 2,010 miles of forest buffer along the streamsides of the Chesapeake Bay watershed, to increase the use of all streamside buffers, and to conserve existing buffers. Each jurisdiction agreed to develop a plan by June 30, 1998, to do so. The Pennsylvania Department of Environmental Protection (DEP) has led the initiative to develop Pennsylvania's plan, with support from other state agencies, principally the Department of Conservation and Natural Resources (DCNR).

Pennsylvania's Statewide Goal

Governor Ridge advanced the Chesapeake Bay commitment one step further, and decided to expand Pennsylvania Stream ReLeaf statewide. Pennsylvania's plan is intended to both meet the Chesapeake Bay Program goals through voluntary means and to encourage streamside buffer establishment throughout the Commonwealth. It is important to note, though, that only projects meeting certain criteria (see below) will be counted towards Pennsylvania's 600-mile streamside forest buffer goal for the Chesapeake Bay.

Six-hundred Miles in the Chesapeake Bay Watershed

Pennsylvania is committed to reaching our share of the total streamside forest restoration goal, or 600-miles of buffer, within our Chesapeake Bay watershed, which includes the watersheds of the Susquehanna, Potomac, North East and Gunpowder Rivers and the Elk Creeks (see Figure 1).

What are "Restoration" and "Conservation"?

Streamside forest buffer restoration is the re-establishment, maintenance and improvement of a sustainable community of native trees, shrubs, and other vegetation capable of providing multiple buffer functions adjacent to a body of water.

Streamside forest buffer conservation is the management of existing forested shorelines to sustain their natural functions and values.

What Counts as Streamside Buffer to Meet the Goal?

Pennsylvania has participated in an informal Chesapeake Bay workgroup of federal and state agencies that has met regularly since 1996 to help coordinate the states' activities. This group

developed a list of criteria that apply to streamside buffer restoration projects in order for them to count towards the 2,010-mile goal for the Chesapeake Bay watershed. These criteria include:

- the buffer must be at least 35 feet wide from the top of the streambank to the buffer's uphill edge (a width of 50 to 100 feet is strongly encouraged);
- the buffer must contain at least two species of trees or shrubs, or a combination of trees and shrubs;
- natural regeneration is acceptable where nearby trees native to the area can provide a natural source of seeds, and where invasive plant species can be controlled;
- buffers established around wetlands may also count towards the goal;
- conservation of existing forested streamside areas should occur within at least a 100-foot wide corridor;
- buffers restored along lake and pond shores also will be counted towards the bay wide 2,010 mile goal.

Progress will be measured in terms of streambank or shoreline miles.

Where landowners feel that they cannot meet these criteria, they should be encouraged to provide other types of buffers. Buffers that do not meet the criteria will not be counted toward the goal, but can still provide significant benefits.

Many Groups Helped to Develop Pennsylvania's Plan

More than 100 representatives of state wide groups and individuals participated on several technical advisory committees to develop the basis for the plan. Participants represented a wide variety of interests, including land development, forestry, agriculture, local government, professional, watershed advocacy, hunting and fishing, education, business, state and federal government and philanthropic. These committees, which met monthly from May through November 1997, recommended key activities needed both locally and at the state level to restore and conserve streamside buffers. Their recommendations were then compiled into a draft working document. This plan, which incorporates further public and agency review comments, outlines the working document's most important points.

A number of state agencies have regulatory authority and grant programs that can affect streamside areas, and help to restore and conserve streamside buffers. A steering committee of representatives from all state agencies that own or manage lands, or have resources to do so, identified how each can help to reach the goal within its own programs and authorities.

The Plan's Purpose

The report identifies objectives for streamside buffer restoration, conservation, education and outreach, public relations and data collection, evaluation and reporting. These are:

- Restoration – Streamside buffers should be restored where appropriate on lands that border water bodies (whether they are privately owned or owned by government entities), and should be of sufficient quality to improve the waters along which they are established.
- Conservation – All existing streamside buffers should be conserved, with a focus on voluntary incentive-based approaches. Give attention to educating landowners,

improving the natural diversity of forests, protecting existing forest habitat links, prioritizing types of streamside forest buffers according to public goals, and increasing the amount of conserved forest buffers.

- Education and outreach – Educational efforts should provide an understanding of the importance of streamside buffers and their proper stewardship within the larger landscape of Pennsylvania, historically, presently and for the future.
- Public relations – Public relations activities should raise public awareness about streamside buffers and this initiative, generate enthusiasm for it and encourage action.
- Data collection, evaluation and reporting – data voluntarily provided by the public should be used to track progress in restoring and conserving streamside buffers, and should be widely shared.

Consistent with the final report of the Chesapeake Bay Executive Council's Riparian Forest Buffer Panel, this plan encourages a voluntary approach to buffer restoration and conservation, focusing on education, partnerships and incentives.

What Will This Cost?

Properly planning a streamside buffer project to consider site conditions and landowner needs is important for the buffer's long-term viability and cost. The Chesapeake Bay Program's *Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers* (1997) (photocopies available from 1-800-YOUR-BAY, or USDA Forest Service at 304-285-1592) provides a table of estimated costs to establish and maintain a streamside forest buffer.

The estimated per acre costs of planting and maintaining forest buffers are:

- *$507 to plant a buffer, including light site preparation and purchase of tree seedlings (@$1.15 per seedling, and 8ft. by 8ft. spacing);*
- *$58.00 for a reinforcement planting of 50 seedlings two years after the initial planting;*
- *$2,150.00 for tree shelters (@$5.00);*
- *$12.00 per mowing for maintenance, or $54.00 per herbicide treatment.*

Total potential cost per acre to plant, including labor - $565 (without shelters) to $2,715 (with shelters), not including mowing or herbicide treatment.*

Note: one mile of 35 foot wide buffer contains about 4 1/5 acres.

**Herbicides generally are not recommended for use close to water. If no feasible alternatives exist for your purpose, be sure to select a product appropriate for use near water, and to apply it strictly according to label directions. Check with the Pennsylvania Department of Agriculture about need to obtain a pesticide application certification before applying herbicides.*

Using a slightly lower planting density (10 ft. by 10 ft.), costs to plant 600 miles of streamside with 35-foot wide buffers would total about $2.2 million, if the planting is done by volunteers.

Existing programs can provide some cost-share and other assistance (see Table 1). DCNR's *Operation Tree Rescue* will supply seedlings worth an estimated $700,000 for local efforts. The Pennsylvania Department of Corrections has made these seedlings available from land purchased for a correctional facility.

Streamside buffer restoration and conservation prevent water pollution by stopping it at or near its source. These efforts save money in the long run because properly established and maintained buffers prevent water pollution and streambank erosion. They use natural systems for pollution control without the added costs of engineered structures.

The cost of maintaining stream buffers, or restoring them before stream banks become substantially eroded, eliminates or reduces the need for expensive streambank restoration efforts that often must be done if streams are not protected. Stream

restoration and streambank stabilization projects can require substantial effort and resources. Such projects cost an average of roughly $100 per foot of stream, or $500,000 per stream mile (personal communication with Paul Webber, Delaware River Basin Commission). Restoration of two miles of degraded stream and streamside area cost over $750,000 per mile in Fairfax County, Virginia.

Costs to restore degraded streams in Pennsylvania tend to be higher than average because of topographic and land use constraints, and the state's requirement to protect streams from construction equipment. Stream restoration projects involving considerable earthwork and revegetation have ranged from $50 to $500 per linear stream foot, with a median cost of about $300 per linear foot (personal communication with R. Lee Irwin, Skelly and Loy, Harrisburg, and Paul Webber).

The Chesapeake Bay Program's *Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers* (1997) contains a chapter devoted to the economics of streamside forest buffers. It includes cost figures for mitigating stormwater impacts on streams that could have been reduced or prevented by maintaining forested buffers. For example, "*…costs of engineered stormwater BMP's* (best management practices) *range from $500 to $10,000 per acre, and will cost that much again over 20 to 25 years.*"

The *Riparian Handbook* also lists benefits, running into the millions of dollars, that streamside buffers provide. Benefits include: increasing stream stability, removing nutrients, trapping and filtering atmospheric pollution, increasing populations of fish species that provide economically valuable recreational fisheries, erosion control, reducing stormwater flows, increasing property values, providing areas for recreational greenways and wildlife habitat, producing timber, and providing opportunities for crop alternatives and specialty forest products.

WHAT NEEDS TO BE DONE?

Streamside buffers will be restored and conserved throughout Pennsylvania as a community effort and through widespread collaboration. Activities that need to occur at all levels are raising awareness, providing educational opportunities, incorporating buffers into ongoing programs and activities, distributing resources, and providing needed guidance and follow-up.

The major steps needed are:

- ensure stakeholder involvement;
- encourage local and regional collaborative efforts, including prioritizing activities locally, as appropriate;
- set up a framework to provide leadership and coordination;
- ensure coordination of the commitments agencies have made to date;
- pursue incentives;
- develop and provide the necessary educational components;
- ensure that information and other resources are shared; and
- highlight successful efforts, both agency and public.

A Framework for Coordination and Implementation

Active involvement in implementation is needed from the whole range of stakeholders who participated in developing

recommendations for this plan, including the Streamside Forest Fund and American Forests. State agencies stand ready to provide assistance where needed. DEP's Bureau of Watershed Conservation will continue to coordinate the initiative, with key support from DCNR. The following are key tasks:

Promote Cooperative Efforts

Coordination of efforts at the regional and local level is essential for this initiative's goals to be realized. Watershed or regional coalitions can effectively combine participants' resources and attract grant funding from a variety of sources. Potential participants include county conservation districts, active watershed groups, land trusts and municipalities. Foundations and federal and state agencies whose programs can include buffer restoration and conservation should be brought into cooperative efforts early in the process.

Pursue Incentives

Per recommendations of the technical advisory committees, a work group will be convened to plan and begin implementing an incentives package for streamside buffer restoration and conservation. In addition, DEP and steering committee representatives will meet with appropriate state legislative committees and/or individual legislators to update them on this plan and the status of the initiative.

Provide Training Opportunities and Materials

DEP and DCNR are coordinating to develop and present technical training courses for agency staff, including foresters and others involved in providing professional field assistance to landowners and groups, and in maintaining state properties. Training opportunities similar to the Stream Side Forest Fund's Field Days will be provided for municipal officials, local groups and resource professionals, including consulting foresters, industry foresters, agricultural consultants, non-governmental environmental education facility staff and active watershed groups. Educational materials, including a guide and a tool kit will be made available.

Continue the Existing Inter-agency Task Force

DEP's Bureau of Watershed Conservation will continue to coordinate a steering committee of cooperating agencies. Participants are staff members who are working to implement their agency's commitments for streamside buffer restoration and conservation. The steering committee will continue to meet at least annually to ensure progress towards commitments, coordinate activities among agencies, and inform the public sectors affected by the various agency programs that incorporate streamside buffer restoration and conservation.

Convene Work Groups

The technical advisory committees recommended that several actions be further developed by committees or work groups (described further in the next major section). The appropriate work groups involving public and private entities and agencies will be convened to further develop and initiate action plans.

Develop a Map and a Database

DEP will develop and make available for general use a database and map. Both are essential for tracking progress, fostering cooperation and setting priorities.

Pennsylvanians Are Committed to This Initiative

Pennsylvania Stream ReLeaf will be locally-led by those who know the needs and opportunities within their own

communities. Streamside restoration and conservation is already happening community by community and watershed by watershed. The following groups are currently engaged in various aspects of restoring and conserving streamside buffers within their own watersheds:

- municipalities;
- business and industry;
- farmers;
- the academic community;
- professional natural and agricultural resource managers;
- non-profit organizations; and
- private landowners.

The boxed examples throughout this report provide descriptions of various successful approaches.

Although state and federal agencies can provide guidance, educational materials, technical assistance and some funding through existing programs, this initiative will happen only through the active involvement of local citizens' groups, municipalities, landowners, and others vitally interested in their communities' streams.

The owners/operators of a Lackawanna County farm participated in the Chesapeake Bay Program's streambank fencing program for a creek on their property. Through a mini-grant from the Alliance for the Chesapeake Bay, they planted tree seedlings between the fence and the stream, thus protecting several hundred feet of streambank.

HOW WILL THIS BE ACCOMPLISHED?

ReLeaf will be accomplished by local groups' and landowners' identifying needs and opportunities for buffer restoration and conservation projects within their own watersheds.

State agencies will help by providing available resources to local efforts, and by showing their commitment. Those agencies actively participating on the steering committee for this initiative have made commitments for specific actions and changes to incorporate streamside buffer restoration and conservation into their existing programs (appendix A summarizes the commitments made by each participating agency). Agencies will also provide appropriate assistance for local initiatives through existing programs (see Table 1). In addition, each of DCNR's 16 Service Foresters has committed to restoring 2.5 miles of forested streamside buffer annually through working with landowners in their districts.

The committees that developed Pennsylvania's plan recommended activities needed to restore and conserve streamside buffers throughout the Commonwealth. A number of these activities relate to the framework that agencies should establish, but their goal is to provide the necessary support and organization that groups and communities need to accomplish their own local ReLeaf efforts. Education and outreach, and public relations are components of all of the recommendations.

GENERAL CONSIDERATIONS

- Restoration of streamside buffers should occur in all types of areas, including residential, commercial, industrial and agricultural, and should involve the broadest possible participation by affected groups and individuals.
- Streamside buffer restoration most effectively prevents water pollution in a watershed's headwaters.
- Streamside buffer restoration, conservation and education should be promoted as much as possible through existing programs and activities.
- Public relations activities will occur throughout the initiative to highlight successes, and to motivate active participation.
- Local initiatives and cooperative efforts will be the means by which most streamside buffers are established and maintained throughout the Commonwealth. The database that the DEP Bureau of Watershed Conservation plans to develop will facilitate the sharing of practical information and expertise among groups.
- State agencies should set the example on their own lands.
- Landowners' economic dependence on resources from their lands should be considered in promoting and designing streamside buffers and identifying incentives.
- Forest management, which includes timber harvesting with best management practices, is compatible with maintaining functioning riparian forest buffers.
- Existing state and federal programs provide technical and cost-share assistance, notably for agriculture.

RECOMMENDED IMPLEMENTATION ACTIONS

Restoring Streamside Buffers

The following recommended implementation actions address restoring streamside buffers, conserving streamside buffers, and sharing information and showing progress.

Identify incentives

Voluntary participation in streamside buffer restoration should be promoted through an effective and broad incentives package.

Who would be affected – Local governments; landowners who restore buffers.

Who should help to implement it – Representatives of stakeholders (including local governments), grant programs, DEP, DCNR and state legislators.

Getting started –

- A committee including representatives of all stakeholders' groups will be established to identify needs and options.
- The stakeholders' committee will review the conditions and activities that the restoration strategy committee recommended.

Develop a Pennsylvania CREP

The Conservation Reserve Enhancement Program (CREP) allows states to target combined federal (USDA) and state funds

toward high priority resources or environmental issues. Geographic areas or land types and specific conservation practices, including streamside buffers, can be designated for enrollment. Land eligible for enrollment includes cropland and marginal pasture land. In order to qualify for the federal funds, a state must work with the Farm Service Agency and the Natural Resources Conservation Service to develop a comprehensive plan as part of its proposal. Contracts as part of a CREP can range from 10 to 15 years in duration. Participating landowners receive cost share funding for specific management practices.

Who would be affected – Farmers and other eligible landowners.

Who should help to implement it – Agricultural groups, Farm Service Agency, Natural Resources Conservation Service, state legislators, DEP and other interested groups.

Getting started – In the Spring of 1998, various Commonwealth agencies met several times with Farm Service Agency staff, state legislators and others, including farm organizations, to begin developing a Pennsylvania proposal for a CREP. Pennsylvania expects to submit an application for an initial 100,000 acres to Washington, D.C. by late 1998. The application will propose enrollment of agricultural lands in the program to establish streamside buffers, to correct excessive soil erosion and to restore wetlands.

Fund the Forest Stewardship Incentive Program

The DCNR Bureau of Forestry coordinates the Forest Stewardship Program (FSP) and its companion program, the Stewardship Incentives Program (SIP). Funding is through the USDA Forest Service, with administrative support provided by the USDA Farm Services Agency. The FSP provides information, education, and technical assistance to private landowners to encourage sound management of their forest resources. Landowners work one-on-one with foresters and other natural resource professionals to develop a written resource management plan, called a Forest Stewardship Plan. The program pays 75 percent of the cost of the plan, and the landowner pays the balance. Landowners can then qualify for additional cost-share assistance through SIP to implement a wide range of management practices: from tree planting and timber stand improvement to wildlife and fish habitat enhancement to wetland restoration and stream buffer restoration.

With half a million private forest landowners in the state, Pennsylvania's SIP program is drastically under funded. The state received an average $40,000 annually for the last three years. Historical usage earlier in the decade, when funding levels were higher, indicates a demand for at least $300,000 annually with current DCNR staffing levels. With field staff support from the Game Commission (PGC), Fish and

Boat Commission (PFBC), and U.S. Fish and Wildlife Service (USFWS), the demand could easily exceed $1 million annually.

Who would be affected – Private landowners with between five and 5,000 acres of woods or associated lands (excluding active crop or pasture lands)

Who should help to implement it – DCNR, PGC, PFBC, USFWS, DEP and legislators

Getting started – Some funding for the short-term will be provided through DEP's statewide nonpoint source program (Section 319). Longer term funding sources should be identified. DEP's Bureau of Watershed Conservation will meet with DCNR's Bureau of Forestry by October 1998 to develop an action plan.

Use existing tools locally

Promote streamside buffer restoration locally. Provide the streamside buffer tool kit to local municipalities, groups, resource professionals and landowners who want to establish buffers. Provide information on local government planning tools and techniques such as case studies and model voluntary local watershed programs. Enlist the participation of local and statewide land trusts in streamside buffer restoration.

Who would be affected – Municipalities, developers, landowners, local groups, natural resource professionals and land trusts.

Who should help to implement it – Municipalities, developers, landowners and resource managers, plus citizens' groups, land trusts, grant programs, Chesapeake Bay Program (in applicable areas), local government associations, Pennsylvania's Center for Local Government Services, DEP and American Forests.

Getting started

- An educational program will be developed specifically for municipalities that addresses streamside forest benefits, and restoration and conservation techniques available to local governments.
- DEP will prepare case studies of local projects that have successfully restored streamside buffers.

The Chester County Board of Commissioners has provided substantial funding for the Chester County Heritage Park and Open Space Municipal Grant Program. One element is ***Greenways Grants*** *for local municipalities that want to work on conserving greenways. Greenways Grants provide up to 50 percent reimbursement of approved costs up to $100,000 for purchasing land or conservation easements, improving biodiversity and other projects. (Multi-municipal projects get a larger reimbursement.) Project applications that address greenway improvements for riparian buffers get a better score than those that don't.*

Continue needed research

Encourage and support research on the design, implementation and benefits of streamside buffers on all types of lands.

Who would be affected – Colleges, universities, environmental research centers and citizens' groups with expertise; the results will benefit everyone involved with streamside buffers and water quality.

Who should help to implement it – the groups mentioned above, plus grant programs and foundations.

Getting started – DEP and DCNR will convene in the Fall of 1998 a meeting of groups and individuals currently involved in streamside buffer research in Pennsylvania to identify research needs. Results will be shared with the general public, legislators, and managers of grant programs and foundations. Providing a means of quickly sharing results of grant-funded research projects should also be considered.

*The Chesapeake Bay Foundation provides **short-term land conservation loans** to groups and individuals for protection of wetlands and forests and other priority areas*

Restore streamside buffers on Commonwealth lands

State agencies that own or manage land should include buffer restoration and maintenance in their plans, policies, budgets and staff training programs. These activities may also be submitted as part of the agencies' plans under the Governor's Green Government Council. Where agency resources are limited, water and habitat quality, project visibility and educational opportunities should be considered in prioritizing projects.

Who would be affected – State agencies and staff, and the general public, once projects are completed.

Who should help to implement it – State agencies, staff and volunteers as applicable.

Getting started –

- Agencies that actively participated on the Steering committee for this streamside buffer initiative have identified streamside areas where they can plant buffers. They have also identified program areas that can incorporate streamside buffer restoration and conservation, and committed to taking specific actions towards those goals.

- DEP will set up meetings with their directors and land management staff of any additional state agencies to discuss streamside buffer restoration and conservation on applicable properties.

- The Governor's Green Government council was established in March 1998 to facilitate the incorporation of environmentally sustainable practices, including strategic environmental management, into Commonwealth government's planning, operations, and policy making and regulatory functions. DEP will meet with Council staff by August 1998 to identify ways of assisting agencies in including streamside buffer restoration and conservation in their Green Plans.

- A training course will be made available to state agency staff that includes technical and practical aspects of restoring and maintaining streamside buffers.

*DCNR owns about 122 miles of streams in its **State Parks** within the Chesapeake Bay watershed. Approximately 104 miles, or 85 percent, have a 100-foot wide forest buffer. Some of the remaining 18 miles of streamside have shrub wetlands. The remaining miles are either kept open for public access to water bodies, or may be planted with trees in the future. DCNR has committed to identifying currently open streamside areas in its state parks where streamside forest buffers can be restored. A demonstration project is planned for Mt. Pisgah State Park, Bradford County, for the spring of 1999.*

Promote the establishment of high quality buffers

Streamside buffer establishment should become synonymous with restoration of native streamside forest, or other native plant communities appropriate for the geographic region of each project. This means that, wherever site conditions allow, landowners should be encouraged to restore plant communities. Native plants from local seed sources should be used. Hybrid plants and horticultural cultivars should not be used.

Who would be affected – Groups and individuals planning projects and obtaining plants, plant suppliers (nurseries), professionals advising groups, arboreta, colleges and universities.

*A cooperative effort restored native forest to the streamside zone along the entire length of a small stream in **Chester County**. Corn fields starting on the banks of both sides of the stream were moved back 95 feet, and replaced with deciduous tree seedlings in a 75-foot wide corridor closest to the stream, and warm season grasses in the remaining 20-foot wide corridor between the new seedlings and the corn. Partners in the project and their roles were*

- *W.B. Dixon Stroud, landowner*
- *USDA Forest Service, project design*
- *Stroud Water Research Center, project implementation & analysis*
- *PA DCNR Bureau of Forestry, seedling source*
- *Avon Grove School District, students who planted seedlings.*

Who should help to implement it – the groups listed above; state agencies.

Getting started –

- Lists of plant species appropriate for streamside planting, and native to various regions within Pennsylvania, will be prepared and made available to the public and involved professionals, including plant nurseries. DCNR and the Alliance for the Chesapeake Bay have prepared some lists; additionally, the Morris Arboretum maintains a database of Pennsylvania plants.
- Lists of invasive plant species that should be discouraged in streamside buffers should likewise be developed and made available to the public, along with environmentally and economically sound means of controlling them or removing them from a site. The Pennsylvania Department of Agriculture's list of noxious weeds could be one basis for this list.
- DCNR, the Alliance for the Chesapeake Bay, the Department of Agriculture (noxious weeds list), the Morris Arboretum, and other interested experts should cooperatively review the lists developed to date, modify them as appropriate, and make them available for inclusion in training materials, the tool kit and appropriate mailings.

Conserving Streamside Buffers

Identify new incentives

Legislation should be considered to encourage buffer conservation by providing some tax incentives for maintaining existing buffers. Conserving buffers of at least 100 feet should be encouraged.

Who would be affected – Landowners who conserve existing streamside buffers; municipalities.

Who should help to implement it – Landowners, municipalities, DEP, DCNR, state legislators.

Getting started – The committee established to develop incentives for streamside buffer restoration should also include conservation in their agenda.

Encourage conservation through local planning

Encourage promotion of buffer conservation through the following local county and municipal planning activities:

- innovative land development planning, such as use of conservation subdivisions.
- revisions to county planning documents.
- municipal stormwater management ordinances.

Who would be affected – Landowners, developers, municipalities, local government associations, county planning agencies, and consultants and engineers for all of these groups.

Who should help to implement it – The groups mentioned above, and the Center for Local Government Services.

Getting started –

- Provide educational information, including examples of successful conservation subdivisions, model ordinances, and ways that county planning documents could include information related to buffer conservation.
- Identify relevant areas needing more research.
- Coordinate outreach to municipalities and counties with the Chesapeake Bay Program's Local Government Advisory Committee, the Center for Chesapeake Communities and other appropriate groups.
- Develop a recognition program for communities that conserve their existing buffers.

Encourage actions by citizen groups

Solicit active involvement of citizens' watershed and monitoring groups in enhancing and promoting streamside buffers and in collecting data on their value.

Who would be affected – citizens' groups, landowners, environmental resource professionals, DEP and DCNR.

Who should help to implement it – those affected, plus grant programs and foundations.

Getting started –

Provide educational information to citizens groups on buffer conservation and how they can support it.

- Work with DEP's existing volunteer monitoring program to identify possibilities and issues around data collection and to develop an action plan.
- Coordinate with areas identified as needing research.

Include in watershed or stormwater management plans

Encourage the state to designate grant moneys for watershed or stormwater management plans that incorporate streamside forest buffer conservation.

Who would be affected – Grant applicants, and watershed and stormwater management grant programs.

Who should help to implement it – Those mentioned above.

Getting started – DEP's Bureau of Watershed Conservation will meet with the appropriate state program managers by January of 1999 to discuss how and to what extent this could be done. Major programs may include: Key '93 (DCNR), stormwater management (DEP), abandoned mine reclamation (DEP), and the statewide nonpoint source program (Section 319). Some commitments have already been made to incorporate changes. The content of some programs is limited by law.

The Octoraro Watershed Association, in ***Chester and Lancaster counties,*** *received a $40,000 Rivers Conservation Grant from DCNR to create a watershed conservation plan. This plan will establish conservation partnerships with local municipalities and community organizations to protect watershed streams (with an emphasis on headwater streams), identify and preserve critical natural areas and provide conservation opportunities in watershed communities. Streamside forest buffer conservation will be a part of the plan.*

The 21st Century Environment Commission & Streamside Buffers

Continue to coordinate activities with those of the 21st Century Environment Commission as it defines the environmental priorities for the Commonwealth as we enter the next century.

Who would be affected – The 21st Century Environment Commission and Stream ReLeaf participants, initially. Other interested parties may potentially be affected as the recommendations proceed.

Who should help to implement it – DEP and other agencies and individuals participating in Stream ReLeaf, and other interested parties.

Getting started – A number of state agencies and non-governmental organizations have participants in both Stream ReLeaf and the 21st Century Environment Commission. These participants should continue to provide coordination between the two initiatives. In addition, staff from DEP's Bureau of Watershed Conservation will review the 21st Century Environment Commission's draft report, released in June 1998, and prepare comments if appropriate. Other agencies and people interested in streamside buffers should do the same. The Stream ReLeaf steering committee and implementation committees should ensure coordination on any activities that result from the Commission's final report.

DCNR's Bureau of Forestry owns and manages forest land along innumerable miles of streams. The bureau requires 100 to 200 feet of forest buffer to remain along most waterways following timber harvest in ***State Forests****.*

Maximize Available Private Sector Programs and Activities

Promote the use of existing voluntary best management practices (BMPs) in the management of forestry activities in and along streamside buffer areas. Encourage landowners to use Sustainable Forestry Initiative (SFI) practices and SFI-trained forestry practitioners to manage forestry activities in riparian areas.

Who would be affected? – Forest landowners and resource management practitioners.

Who should help to implement it? – DEP's Bureau of Watershed Conservation, DCNR's Bureau of Forestry, forest products industry, PSU Cooperative Extension, forest land-owners, and others interested in buffer conservation.

Getting started – The Sustainable Forestry Initiative of PA should emphasize the need for applying responsible forest management practices, including BMPs, in all existing forested riparian areas as part of its statewide forest landowner education and outreach program and continue to train foresters and loggers on the importance of buffer conservation in the environmental logging component of its training curriculum for forestry practitioners.

Sharing Information & Showing Progress

Set up a central information system

A single location should be available to receive information about streamside buffer projects, organize it, share it and evaluate progress toward goals.

Who would be affected – Initially DEP, DCNR and groups who want to contribute information

about their projects. Once the system is set up, anyone wanting information about streamside buffers in Pennsylvania will benefit.

Who should help to implement it – DEP's bureaus of Watershed Conservation and Information Services, with input from the public.

Getting started –

- Forms and instructions for submitting information will be made locally available by September 1998.
- DEP's Bureau of Watershed Conservation and appropriate partners will develop a proposal for the system, addressing both local projects and efforts of state and federal agencies.
- Information about streamside buffers has been added to the DEP and DCNR web-sites (access http://www.dep.state.pa.us or www.dcnr.state.pa.us).
- The data entry form is available on the web site for direct entry of project information.

Develop a statewide map

A statewide map will be developed such that restoration of buffers of any width can be recorded.

Who would be affected – Same as above.

Who should help to implement it – Same as above.

Getting started –

- A map showing the location of streamside buffer projects will be made available and regularly updated on the DEP website.
- DEP and DCNR will continue to evaluate existing GIS information and satellite imagery for usefulness, cost and feasibility. GIS elements will be incorporated into mapping when feasible.

WHAT CAN WE DO TO RESTORE AND CONSERVE STREAMSIDE BUFFERS NOW?

Information and assistance for planting and maintaining streamside buffers already exist for individual landowners, citizens' groups, municipalities and agencies. The first steps are the same, whether you intend to plant a few trees along a stream on your property, or whether your group works to establish them along miles of stream throughout your community's watersheds.

A farm owner and the Ruffed Grouse Society cooperated with federal and state agencies to restore one acre of emergent wetlands, including a shrub buffer area, on a ***Huntingdon County*** *farm.* *Water control structures adjust the water depth behind constructed dikes to favor growth of food and cover for wildlife. Additional wildlife habitat surrounding the wetland has been planted with trees and shrubs. Agency partners were: Huntingdon County Conservation District, Southern Alleghenies Resource Conservation and Development partners, Pennsylvania DEP, Pennsylvania Game Commission, U.S. Fish and Wildlife Service, Natural Resources Conservation Service, and U.S. Army Corps of Engineers.*

Find out what's going on in your community or watershed. Team up with local groups and agencies that have started to work on streamside buffers, or that have already done some projects. Many counties and watershed organizations have already started to plan for buffer restoration in their areas (see Appendix B for a map showing both county and major watershed boundaries). Take advantage of any state or federal programs that might fit your situation.

Contact local agencies, nonprofit organizations or other professionals who have experience in preparing natural resource or conservation plans. These include your county conservation district, the DCNR Service Forester, DCNR's Bureau of Forestry, DEP's Bureau of Watershed Conservation, the Alliance for the Chesapeake Bay, and private natural resource managers (many contacts are listed in Table 1, and a list of addresses and telephone numbers is included in Appendix C). Additional sources of help are:

- colleges and universities with environmental programs for various types of expertise and help, depending on the background and research interests of their staff and their programs;
- the Pennsylvania Landscape and Nursery Association for names of local nurseries that stock native trees and shrubs; and
- local conservancies, watershed associations and sporting groups having staff and volunteers trained and experienced with buffer restoration for practical advice and possible sources of labor.

Plan Before You Plant

Identify potential planting locations - areas where streamsides lack shrubs or trees, or where bare soil is exposed to erosion along the shore. If you have not done so, contact the landowners to get their permission and enlist their help.

Completing a buffer project plan requires walking along the stream, and determining the landowner's goals and wishes. The landowner's commitment is essential for the project's success.

Once you have identified a site or sites, consider whether the existing stream banks are stable. If they are extensively eroded, you should obtain professional help in evaluating the need for streambank restoration *before* buffers are planted. Rapidly eroding stream banks could undermine seedlings before they become established. Extensive streambank restoration will require additional time, professional advice and funding. The *Chesapeake Bay Riparian Handbook* devotes an entire chapter to streambank stabilization as a component of streamside buffer restoration. The *Handbook* states: "To be successful, stream stabilization projects should be carefully planned with the help of technical assistance, should take a watershed approach, and should incorporate solutions that protect habitat, water quality and aesthetics."

Planning properly to account for site conditions and to meet landowner goals is essential for the plants' survival, and for ensuring the buffer's long-term functions. A site plan should include the following:

- the site's physical and hydrological (water-related) characteristics;
- existing vegetation at the site, including the presence of sensitive species or habitats that should not be disturbed, or invasive species that could compete with new seedlings or saplings;
- landowner uses or concerns - existing and future;
- buffer design, including width and appropriate native plant species;
- any site preparation needed prior to planting;
- estimates of cost and labor requirements;
- a schedule for planting the buffer, and
- maintenance needs and schedule.

The *Pennsylvania Streamside Reforestation Guide* provides guidance for individuals, local groups and agencies for developing plans. The *Chesapeake Bay Riparian Handbook* provides extensive technical background information and guidance, and is especially useful for professionals.

The Alliance for the Chesapeake Bay partnered with Harrisburg State Hospital, the Capital Area Greenbelt Association and the National Tree Trust to restore forested buffer along approximately one mile of ***Asylum Run, a Susquehanna River tributary*** *near Harrisburg. Over 70 volunteers planted 2,500 bare-root seedlings in a 75-foot wide strip along the Run and an intermittent tributary in just one spring day in 1997. Despite a dry summer and fall, overall tree survival along Asylum Run has ranged from 75 to 80 percent. Area Boy Scout troops are helping with maintenance until the trees reach self-sustaining height.*

The next steps are to locate sources of native trees, shrubs or grasses, and determine their availability. The person or group who helps you develop the plan should be able to help you with

this. Other sources of this information include the Pennsylvania Landscape and Nursery Association and the Alliance for the Chesapeake Bay.

Identify and contact your sources of labor. If you intend to use volunteers, potential sources of help are local conservation and community groups, schools and youth groups. The *Pennsylvania Streamside Reforestation Guide* provides guidance for working with volunteers.

Once a buffer is planted, some maintenance is essential for two to three years to ensure that the plants become established. Maintenance may include mowing around trees and shrubs a few times a year to reduce competition from other plants, removing or controlling invasive species, mulching, and possibly replacing any trees and shrubs that do not survive (some mortality is normal, even in optimal conditions). A buffer of trees and shrubs will not reach its full potential for pollution prevention and control for at least several years. Some experts recommend that established grass buffers be harvested annually. This removes the nutrients contained in each year's growth from the streamside, rather than making them available when the grasses die and decay each year.

Some Assistance Is Available

Programs that Include Streamside Buffer Restoration

Existing programs and projects can provide you with information, on-site help, training or funding, depending on the program. The major ones are listed on Table 1. These programs often include streamside buffer conservation or restoration as part of broader objectives.

Methods to Conserve Streamside Buffers

Many methods are available to conserve streamside forest buffers on your land, in your municipality or in your watershed. These include conservation plans, conservation easements, farmland protection programs, open space preservation, comprehensive land use planning, land development (subdivision, zoning, stormwater) ordinances, forest management plans, flood plain management and mitigation for lost public lands. More details about these methods are presented in Table 2.

Available Educational Materials

Publications and other materials that provide a wide range of information about streamside buffers are available from a variety of sources. Table 3 is a list of some references having the broadest application, and where you can get them.

A "tool kit" of information about streamside buffers and how to restore and conserve them will be available through DEP's Bureau of Watershed Conservation, or the Alliance for the Chesapeake Bay, in the Summer of 1998.

In 1997, Natural Lands Trust, Inc., published **Growing Greener: Putting Conservation into Local Codes**. *This 16-page booklet describes how municipalities can incorporate flexibility into the land development process to protect open space (which may include riparian areas) without reducing the overall density of homes. Tools include municipal comprehensive plans, zoning ordinances, and subdivision ordinances.*

Public Relations Resources

Many efforts are under way to garner support and publicity for streamside buffers. Some groups and communities conduct tree plantings and publish materials on their importance. Environmental interest groups and government agencies provide publicity through newsletters, opinion pieces in the newspapers and through other outlets. These resources can be tapped for a statewide campaign. Through sharing publications, slogans and other resources we can combine forces to get the message out about the importance of streamside buffers.

American Forests' "Global ReLeaf" program is an example of a national campaign to promote tree planting. Pennsylvania has joined Maryland and Virginia in adopting the name "Stream ReLeaf" for this initiative, in cooperation with American Forests. This will help to promote a unified message bay wide and beyond about this initiative. We have developed a brochure for Pennsylvanians that uses this name and logo and that provides introductory information about streamside buffers and the initiative. Titled "Pennsylvania Stream ReLeaf, Replanting the Streamsides of Penn's Woods", it will be available through both DEP's and DCNR's Offices of Policy and Communications, and DEP's Bureau of Watershed Conservation in the Summer of 1998.

Planning for and Tracking Progress - Where to Start

No matter what the scale of your project, a map of some type is necessary for proper planning and sharing information about your project with others. Maps are also required for conservation and other natural resource plans. A map showing how your project or projects fit into the larger geographic area, such as a watershed or a municipality, may be required in order to obtain funding from grant programs. A good map to start with is the 7.5 minute USGS topographic map of your project vicinity. These maps are often available from county planning offices or engineering/survey supply stores. Alternatively, copies may be ordered from USGS Map Sales, Box 25286, Federal Center, Bldg. 810, Denver, Colorado 80225. County planning offices may also have helpful maps that they developed for their county. In order to be useful, maps must show and name your county's water bodies and municipalities.

Some essential information about your project will be needed in order for it to count toward the Chesapeake Bay Program's 2,010-mile goal, if it is within the Bay's watershed. This information is listed in the Attachment along with additional desired information.

***Lititz Run, Lancaster County**, has been the focus of a number of streamside buffer restoration projects involving partnerships with Octoraro Native Plant Nursery, Warwick Township, developers, Lititz Borough, LandStudies, Inc., Farmers First Bank, Trout Unlimited, Chesapeake Bay Foundation, the Millport Conservancy, and Warwick High School. Activities include establishing streamside buffers, creating wetlands, providing conservation easements for forested streamside buffers in an industrial development, and development of an educational plant nursery for learning-impaired students. The Octoraro Native Plant Nursery provided technical assistance and bare root plants, which students planted in two-gallon containers two years ago. These plants are being used for several of the streamside forest buffer projects.*

Even if your project does not meet the Chesapeake Bay Program buffer criteria or is outside of the Chesapeake Bay watershed, Pennsylvania would like to keep track of the amount of streamside forest being both restored and conserved. Having a complete picture of streamside buffer activities statewide will help to facilitate broad sharing of project expertise, in evaluating the initiative in the future and in obtaining support.

A sample blank data sheet for providing your projects' information to DEP is included in this report as Attachment 1. Additional copies are available through your county conservation district office or DEP's Bureau of Watershed Conservation.

THE FUTURE OF THIS PLAN

Everyone Has an Important Role

This plan provides a starting point for those who will actually be replanting and protecting the streams of Penn's Woods. Many of the potential roles of various groups and agencies in restoring and conserving streamside buffers in Pennsylvania are listed below. This plan should remain flexible to accommodate needed changes identified as groups share their experiences.

Group or Agency	***Recommended Roles Related to Streamside Buffers***
Landowners including Farmers	provide the site and commitment. authorize natural resource plans. provide stewardship of their lands. pursue cost-sharing and other help.
Municipalities	incorporate buffers into comprehensive plans and land development and subdivision decisions. educate residents. manage stormwater. manage infrastructure affecting streams. obtain grants. work with engineers and other development professionals. develop planning reports. manage parks and other public open space. complete demonstration projects.
Counties	guide local planning. provide expertise and help. conduct sewage facilities and stormwater management planning. develop planning reports. coordinate with adjacent counties. manage parks and other public open space.

Group or Agency	*Recommended Roles Related to Streamside Buffers*
Watershed and Other Citizens' Groups	provide expertise and help. know and work with landowners. provide and guide motivated volunteers. provide volunteers for planting and maintenance. educate residents and members. participate in local planning. conduct watershed-based planning. conserve and restore natural resources. obtain grants. develop greenways. complete demonstration projects.
Individuals and Families	restore and conserve buffers on their own land. volunteer to help restore buffers elsewhere. educate neighbors. work with municipal and county governments.
Schools, Colleges and Universities	educate students and their families. develop local projects. provide motivated volunteers. generate positive news. participate in Envirothons and other environmental education programs. obtain grants. conduct surveys and research. complete demonstration projects. provide expertise and guidance to organizations/agencies.
Conservation Districts	provide expertise. provide organizational skills. help to coordinate local efforts. help to identify sources of grants. consider coordinating or developing a county-wide plan for encouraging streamside buffers. sponsor, or co-sponsor demonstration projects. work directly with landowners. develop conservation plans.

Group or Agency	***Roles Related to Streamside Buffers***
State Legislators	stay aware of activities and needs. support incentives packages and grant/cost-share programs. educate constituents
Consultants/Professionals	provide expertise and promote public awareness. design and oversee buffer projects.
Nurseries and Landscape Architects	provide native species of plants. provide expertise and assistance for planning, planting and maintenance.
Pennsylvania Agencies	provide educational materials and training. provide grants/cost-share through existing programs. provide technical expertise. help to coordinate activities. promote public awareness. house, manage and share project information. track progress. provide a link to federal programs. provide a link to other Chesapeake Bay Program states. modify policies to enhance buffer conservation and restoration. demonstrate benefits on public land.
River Basin Commissions	provide expertise. provide data. facilitate coordination.
Federal Agencies	provide educational materials and training. provide grants/cost-share through existing programs. promote public awareness. facilitate information sharing among states. track overall progress for the Chesapeake Bay Program. provide technical expertise.
Agricultural and Forest Resource Organizations	educate landowners. provide information and training. promote the use of best management practices.

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Stream REALEAF®
Replanting Pennsylvania's Streamsides

TABLE 1. AVAILABLE SOURCES OF ASSISTANCE FOR SHORELINE BUFFER RESTORATION

Who program helps	Project or Program	Organization & Address	Contact Information	Type of Assistance
Anyone involved in development	BMP Handbook for Developing Areas - planning concepts and best management practices	Natural Resources Conservation Service One Credit Union Place Ste. 340 Harrisburg 17110	Barry Franz 717/782-4403	Education - technical reference manual targeted at developers, engineers, municipal officials, Cons. Dists, & others involved in development.
Developers, Farmers, Municipalities, & Conservation Districts	Erosion & Sediment Pollution Control Programs	PA DEP, Bureau of Water Quality Protection	Kenneth Reisinger 717/787-6827	Educational assistance related to E&S control plans.
Farmers	Streamkeepers Program	Chesapeake Bay Foundation	Matthew J. Ehrhart 717/234-5550	For 9-12 grade - students plant buffers after streams are fenced by others.
Farmers	Conservation Reserve Program - protects sensitive areas through 10-15 yr. contracts.	USDA Natural Resources Conservation Service One Credit Union Place Ste. 340 Harrisburg 17110	Gary Smith 717/782-3458	Technical assistance; 50% funding for install. of seedlings, fencing, crossings. Part of program - continuous sign-up; another part announced - sign-up periods of 30 day. Some educational efforts.
Farmers	Wetland Reserve Program - restoring wetlands & linked riparian buffers	USDA Natural Resources Conservation Service One Credit Union Place Ste. 340, Harrisburg 17110	Gary Smith 717/782-3458	Tech. & financial assistance; education.
Farmers	Environmental Quality Incentives Program - establishes geographic priority of areas to receive funding; may target statewide resource concerns.	USDA Natural Resources Conservation Service One Credit Union Place Ste. 340 Harrisburg 17110	Gary Smith 717/782-3458	Financial assist. for practice installation; tech. & educ. assist. Cost share for fencing, str. crossing, & altern. watering sources.

(Table 1 Continued)

Who program helps	Project or Program	Organization & Address	Contact Information	Type of Assistance
Farmers	Noxious weeds program	PA Department of Agriculture 2301 N. Cameron St. Harrisburg 17110-9408	Karl Valley 717/772-5226	Information & assistance with noxious weed species that may grow in the buffer.
Farmers & Local groups	Sustainable Agriculture Program	PA Department of Agriculture 2301 N. Cameron St. Harrisburg 17110-9408	Lee Bentz 717/772-5204	Education/outreach to farm community; grants for education & research.
Farmers	Animal Health Programs	PA Department of Agriculture 2301 N. Cameron St. Harrisburg 17110-9408	Dr. Ostrich 717/783-6677	Educational materials explaining disease concerns related to animal access to streams.
Farmers doing nutrient management plans	Nutrient Management Act Implementation	State Conservation Commission 2301 N. Cameron St. Harrisburg 17110-9408	Douglas Goodlander 717/705-3895	Grants for nutrient management planning, loans for plan implementation. Plans may address needs for shoreline buffers.
Farmers within the Chesapeake Bay drainage	Chesapeake Bay Streambank Fencing Program	Pennsylvania Department of Environmental Protection	Larry Nygren	Grant programs & assistance: Rivers Conservation.
Local groups & farmers in target watershed	Small Watershed Program (PL-566) - watershed planning & implementation	Natural Resources Conservation Service One Credit Union Place Ste. 340 Harrisburg 17110	Jeff Mahood 717/782-4429	Tech. assist. & funding (up to 65%) for planning & installing practices& cons. easemts. listed in watershed plan.
Farmers & other landowners	Wildlife Habitat Incentives Program	USDA Natural Resources Conservation Service One Credit Union Place Ste. 340, Harrisburg 17110	Gary Smith 717/782-3458	Cost sharing; educational & tech. assist.

(Table 1 Continued)

Who program helps	Project or Program	Organization & Address	Contact Information	Type of Assistance
FFA Chapters	Operation Green Stripe - perennial grass buffer strips with plans to extend to shrub/forest; corporate partnership w. Monsanto Co.	Pennsylvania Power & Light Co. Two North Ninth St., GENTW-8, Allentown, 18101	Wayne "Skip" Young 610/774-5166	Educational program using FFA chapters; $ awards to FFA Chapters that recruit landowners into the program. Tech. assist.
Landowners	Activities & services to enhance & protect wildlife through habitat restoration, devel. & maint.; education; improvs. in land & water mgt. policies	Pheasants Forever Susquehanna Valley Chapter Box 2322 York 17405-2322	John Gaskins 610/857-2586 Karen Groff 717/390-0717	Proposals due in May. Services & assistance are available to any landowner, with little or no cost. Chapter helps streambank fencing landowners obtain & plan.
Landowners & local groups	Chesapeake Bay Program - Habitat Restoration Workgroup	Pennsylvania Department of Environmental Protection P.O. Box 8554 Harrisburg 17105-8554	Division of Waterways, Wetlands & Erosion Control 717/787-6827	Yearly grants for on-the-ground projects. RFP encourages riparian forest buffers. Eligibility - open.
Landowners & agencies	PA Wetland Replacement Project - facilitate restor. of wetlands & riparian corridors	Pennsylvania Department of Environmental Protection P.O. Box 8554 Harrisburg 17105-8554	Division of Waterways, Wetlands & Erosion Control 717/787-6827	Funding for wetland restoration. After wetland restor. goals met, funding available for riparian corridor restor. funding is for construction and plant materials
Landowners w. forest	Forest Stewardship Program	PA DCNR Bureau of Forestry	Gene Odato 717/787-2106	Funding and technical assistance for Forest Stewardship planning & implementation.
Local groups, agencies & individuals	PA streamside buffer mini-grant	Alliance for the Chesapeake Bay 225 Pine St. Harrisburg 17101	Brook Lenker 717/236-8825	Education & training; fund raising & administration; gifts & grants for community riparian restoration; provide tree seedlings to volunteers.

(Table 1 Continued)

Who program helps	Project or Program	Organization & Address	Contact Information	Type of Assistance
Local groups	Embrace-A-Stream Program (EAS) - provides grants to TU chapters for stream sect. or watershed enhance. progs., esp. for cold water fisheries. Grants limited to max. of $10,000/yr for 3 yr. Match required.	Trout Unlimited	Dr. William R. Kodrich R.D.13, Box 186 Clarion 16214 814/764-3551	TU has paid & volunteer professional staff to provide tech. assist. & other services.
Local groups, agencies & individuals within the Schuylkill River Basin	Streambank/Riparian Restoration	Schuylkill Riverkeeper P.O. Box 459 St. Peters PA 19470	Carol Cloen 610/469-6005	Restoring up to 50 mi. of streambank or streamside forest. Assist in planning (Riverkeeper), restoration design (Patrick Cntr., Acad. Nat. Sciences), & Tech. assistnc., organ. of volunteers, & some funding for materials & trees.
Local groups, watershed associations	funding and technical assistance for local groups	in PA - Canaan Valley Institute 650 Leonard St. Clearfield PA 16830	Janie French PA Watershed Coordinator 814/768-9584	Promotes the development and growth of local associations committed to improving or maintaining the natural resources of their watersheds, in the Mid-Atlantic Highlands portions of PA, MD, VA, and all of WV.
Local groups & municipalities	Heritage Parks Program	PA DCNR, Bureau of Recreation & Conservation	Tim Keptner 717/783-0988	Grants (require match of 25 to 50%).
Local groups & municipalities	Community Work Programs	PA Department of Corrections	Jacob D. Bliek 717/975-4884	Labor force for planting & maintenance; available for sites near correctional facilities
Local groups & municipalities	Community Grant Program	PA DCNR, Bureau of Recreation & Conservation	Tom Vargo 717/787-4130	Key '93 Grants - require 50% match, plus land ownership or control for 25 yrs.

(Table 1 Continued)

Who program helps	Project or Program	Organization & Address	Contact Information	Type of Assistance
Local groups & municipalities	Rivers Conservation Program	PA DCNR, Bureau of Recreation & Conservation	Marian Hrubovcak 717/ 787-2316	Grants for rivers conservation plans; require 50% match.
Local groups & municipalities	Rails-to-Trails Program	PA DCNR, Bureau of Recreation & Conservation	Wilmer Henninger 717/772-3704	Funding (50%) for trail planning, acquisition & development.
Local groups & municipalities	Bureau of Recreation and Conservation grant programs	Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation & Conservation	Darrel Siesholtz 717/783-2661	
Municipalities	Community Revitialization Program (CRP)	Center for Local Government 433 Forum Building Harrisburg 17120	Brian Cairns 717/787-3003	Help to communicate PA ReLeaf goals to the local level; funding.
Township Supervisors	Magazine for township supervisors	PA State Association of Township Supervisors	James Wheeler 717/763-0930	Education and information exchange.
Schools	Environment & Ecology Programs	PA Department of Education	Patricia Vathis 717/773-6994	Materials and assistance, curricula, standards, & tests - through existing channels.
Urban areas; schools	Urban Forestry program	Morris Arboretum 9414 Meadowbrook Ave. Philadelphia 19118	Bob Gutowski & Brooks Mullahy 215/247-5777	Education & outreach; lists of appropriate species for planting.
Loggers & silviculturists	Streamside Management Guidelines	PA DCNR, Bureau of Forestry	Gene Odato 717/787-2106	Guidelines used on state forest lands - applicable on other lands.

(Table 1 Continued)

Who program helps	Project or Program	Organization & Address	Contact Information	Type of Assistance
Citizens' groups, municipalities, schools, colleges, agencies, local businesses	Community Improvement Grant	Pennsylvania Urban and Community Forestry Council, Extension Urban Forester for your area (Meadville, Washington. University Park, West Pittston, or Collegeville)	*Meadville* – Scott Sjolander 814/333-1590 *Washington* – Mark Remcheck 412/228-6881 *University Park* – William Elmendorf 814/863-7941 *West Pittston* – Vince Cotrone 717/825-1701 *Collegeville* – Julianne Schieffer 610/489-4315	Grants up to $3,000 for tree related training, education programs neighborhood inventories, tree maintenance; and plant projects, including restoring vegetation along streams. Projects must be in urban areas.

TABLE 2. METHODS TO CONSERVE EXISTING RIPARIAN FOREST BUFFERS

METHOD	DESCRIPTION	CANDIDATES FOR IMPLEMENTATION
Conservation Plans	A written plan for a landowner detailing best management practices for conservation of the land; a riparian forest buffer will control and prevent soil erosion. Contact: county conservation districts, Natural Resources Conservation Service, Cooperative Extension Service.	Business/Industry Agriculture Government Local municipality School Non-profit organization Private landowner
Conservation Easements	A legal agreement landowners voluntarily make restricting the type and amount of development that occur in perpetuity. Executed between private property owners and qualified conservation organizations. These arrangements, if perpetual, provide federal income, estate and gift tax benefits; restrictions are flexible. Disadvantages include abdicating some rights relating to property use; easements do not have to be perpetual; and the landowner remains responsible for land maintenance and other costs of the land. Contact: land trusts, conservancies (see "Wetland and Riparian Stewardship in Pennsylvania," pp. 19-24 and "Protecting Unique Land Resources: Tools, Techniques, and Tax Advantages" by J.A. Gutanski, 1997).	Business/Industry Agriculture Private landowner School Government Local municipality Non-profit organization
Farmland Protection Programs	Preservation of farmland by purchasing development rights from farmers. May include additional provision to conserve riparian forest buffers Contact: county and local governments.	Agriculture Government Local municipality Private landowner Non-profit organization
Open Space Preservation	Preserving open space through a variety of incentives, e.g. bond issues, grant programs, parks and recreation, land development practices, etc. Contact: county and local government.	Non-profit organization Agriculture Government Local municipality
Zoning	Townships implementing land development and stormwater management plans through their zoning ordinances. Contact: township board of supervisors, township zoning board, township planning board.	Local municipality Private landowner

(Table 2 Continued)

METHOD	DESCRIPTION	CANDIDATES FOR IMPLEMENTATION
Transferable Development Rights (TDRs)	Local governments have the right to limit development in one area while opening other areas for development in a process of relocating "zones" through enacting TDRs. Practicable because of zoning codes, land use ordinances and/or regulations. TDRs allow land to remain in the private sector while avoiding undesirable development. Complicated standards of allocation, purchase and sale of development rights need to be established for a legally defensible system. Contact: township board of supervisors, private consultants, real estate attorneys.	Government
Land Use Planning	Townships planning for development can consider conserving existing riparian forest buffers in subdivision and land development plans. Contact: county planning commission, township board of supervisors, township planning commission, private consulting firm.	Local municipality
Forest Management Plan	A plan written by a professional forester that describes forest management for a particular area; a riparian forest buffer can be a recommendation of the plan. Contact: Dept. of Conservation and Natural Resources Forest Stewardship Program (cost-shared), independent forest business.	Business/Industry Agriculture Government Local municipality School Non-profit organization Private landowner
Change Ownership	Change ownership of the land to a public entity that will manage for riparian forested buffers - rails to trails, conservancy, park system, land trust, greenway. The private landowner (land donor) benefits from the tax write-off. (See "Wetland and Riparian Stewardship in Pennsylvania" pp. 29-30 for more information on sale and donation options). Contact: land trusts, conservancies, government agencies.	Local municipality Government Non-profit organization Agriculture School Private landowner
Leases	Rental agreements by a landowner to a conservation group for a specific period of time. Advantages include monthly income to owner. Disadvantages are that leases generally may give unrestricted control to the leasing organization and the buffer conservation is not perpetual. Contact: legal services, conservation groups (see "Protecting Unique Land Resources: Tools, Techniques, and Tax Advantages" by J.A. Gutanski, 1997)	All

(Table 2 Continued)

METHOD	DESCRIPTION	CANDIDATES FOR IMPLEMENTATION
Land Swap	Change ownership of property by deed swap. Contact: legal services.	Industry Agriculture Government Local municipality School Non-profit organization Private landowner
Mutual Covenants	Agreements between nearby or adjacent landowners to manage the future use of the land for conservation. These can be permanent, can be enforced by any single landowner (or future landowners) against other involved members of the covenant. Loss of market value from mutual covenants can not be claimed as a charitable deduction on income tax returns. Contact: legal services.	All
Mitigation for Lost Public Lands	Any public lands needed for transportation projects are replaced with other land (usually of the same type), which then becomes public land. Existing streamside buffers can be replaced with other streamside buffers. If the public landowner wishes, streamside buffers could be considered for replacement of non-buffered land taken. Contact: Pa. Dept. of Transportation.	Local municipality Government
Grant Programs	Funding programs that support development of watershed management plans which will include riparian forest buffer conservation. Contact: private foundations, state government.	Non-profit organization Private landowner School Municipality
Written Policies	Written environmental policies within the business, organization, agency that includes the conservation of riparian forest buffers.	Business/Industry Agriculture Government Local municipality Business Private landowner

(Table 2 Continued)

METHOD	DESCRIPTION	CANDIDATES FOR IMPLEMENTATION
Management Agreements	Pacts between landowners and conservation agencies where one agrees to manage the property in a manner consistent with conservation goals. Landowners may receive direct monetary returns or other types of cost-share assistance; it is ordinarily easier to terminate than a lease but management agreements are not permanent. Contact: land trusts, conservancies.	All
Floodplain Management	Rigid application of policies regarding development in floodplains. (Management plans could add further support to existing federal and state regulations regarding waterways, wetlands and floodways). Contact: local government, county planning commission.	Local municipality
Water Resource Protection Regulatory Programs	Existing state and federal wetland, floodway and other regulatory programs can further promote riparian forest buffer conservation through various mitigation and restoration techniques. Contact: Dept. of Environmental Protection, Army Corps of Engineers.	Government

TABLE 3. LIST OF REFERENCES AND SOURCES OF MORE INFORMATION

Reference/Author/Content	Format	Audience	Contact/Cost
Alliance for the Chesapeake Bay. January 1996. Riparian Forest Buffers. Alliance for the Chesapeake Bay 1-800-662-CRIS.	White Paper	GP	ACB 1-800-662-CRIS
Alliance for the Chesapeake Bay. 1997. Wetland and Riparian Stewardship in Pennsylvania, A guide to Voluntary Options for Landowners, Local Governments and Organizations. Harrisburg, PA.	334 page booklet	L; M; W, S, C, E Groups	ACB 717-236-8825 $1/copy
Alliance for the Chesapeake Bay. 1998. Pennsylvania Streamside Reforestation Guide. Harrisburg, PA.	booklet	GP,.L, M, D, REA, NRMP, W, S, C, E Groups	ACB 1-800-662-CRIS
Center for Watershed Protection. 1996. Site Planning for Urban Stream Protection. Represents fundamentally different approach to site design that protects streams by reducing impervious cover. Explains new concepts & termnology.	Manual	M, D, REA; NRMP	Center for Watershed Protection 8737 Colesville Rd., Suite L-105 Silver Spring, MD 20910 301-589-1890 FAX 301-589-8745 Cost: $35
Chesapeake Bay Program. 1996. Final Report of the Riparian Forest Buffer Panel. Presented to the Chesapeake Executive Council. U.S. EPA.	10 page document	GP	1-800-662-CRIS or 1-800-YOUR-BAY
Chesapeake Bay Program. May 1995. Riparian Forest Buffers: Restoring and Managing a Vital Chesapeake Resource. Conference Proceedings, October 5-6, 1994. US EPA.	136 page booklet	NRMP, M	1-800-662-CRIS or 1-800-YOUR-BAY
Chesapeake Bay Program Forestry Workgroup. August 1996. Forest and Riparian Buffer Conservation: Local Case Studies from the Chesapeake Bay Program. USDA Forest Service pbl NA-TP-07-96.	104 page booklet	M, D, REA, NRMP, W, S, C, E Groups	UDSA Forest Service 1-800-968-7229
Chesapeake Bay Program Forestry Workgroup. January 1997. Restoring a Bay Resource: Riparian Forest Buffer Demonstration Sites. US EPA	64 page booklet	NRMP, W, S, C, E Groups, M	1-800-662-CRIS or 1-800-YOUR-BAY

Table 3. (Continued)

Reference/Author/Content	Format	Audience	Contact/Cost
Cooksey, R., and A. Todd. 1996. Conserving the Forests of the Chesapeake: The Status, Trends, and Importance of Forests for the Bay's Sustainable Future. U.S.D.A. Forest Service pbl. NA-TP-03-96.	35 page booklet	GP	1-800-662-CRIS or 1-800-YOUR-BAY
Cornell University Extension. 1997. Stand by Your Stream: Streamside Protection - Why Bother, an Outreach Program for Stream Management. R. L. Schneider, Dept. of Natural Resources.	fact sheet	GP	R. Schneider DNR Cornell University Ithaca, NY 14850 Free
Cornell University Extension. 1997. Stand by Your Stream: Streamside Management - Do's and Don'ts, Guidelines for Private & Public Landowners. R. L. Schneider, Dept. of Natural Resources.	fact sheet	L, M	R. Schneider DNR Cornell University Ithaca, NY 14850 Free
Duhnkrack, Nancy E. and Janet S. Senior. Oregon's Incentive Approach to Riparian Area Protection. Oregon Environmental Foundation, 2637 SW Water Avenue, Portland OR 97201. 503-222-1963.	book	L; NRMP; W, S, C, E Groups	Oregon Env. Foundation
Ecosystem Recovery Institute. 1996. An Introduction to Stream Processes, Assessment and Restoration. ERI, Freeland, MD.	3-ring binder	NRMP, W, S, C, E Groups, M	Ecosystem Recovery Institute, P.O. Box 249, Freeland, MD 21053 717/235-8426; cost $45.00
Environmental Law Institute. 1997. Protecting Wetlands. Tools for Local Governments in the Chesapeake Bay Region. Chesapeake Bay Program, EPA 903-R-97-008.	110 page booklet	L; NRMP	1-800-YOUR-BAY
Gutanski, J.A. 1997. Protecting Unique Land Resources: Tools, Techniques, and Tax Advantages. Four-Ever Land Conservation Associates, Inc. for the PA Land Trust Assoc.	booklet; includes list of land trusts	GP, L, M, D, REA, NRMP, W, S, C, E Groups	Pennsylvania Land Trust Association
Hoban, T.J. Building Local Partnerships. A Guide for Watershed Partnerships. Conservation Technology Information Center, West Lafayette, Indiana.		W, S, C, E Groups	

Table 3 (Continued)

Reference/Author/Content	Format	Audience	Contact/Cost
Houser, D.F., and K.J. Lutz. 1997. Fish Habitat Improvement for Trout Streams. PA Fish and Boat Commission.		NRMP; W, S, C, E Groups	PFBC 450 Robinson Lane Bellefonte, PA 16823 814-359-5185
Iowa State University Extension. April 1996. Stewards of our Streams - Buffer Strip Design, Establishment and Maintenance. R. C. Schultz, P. H. Wray, J. P. Colletti, T. Isenhar, C. A. Ridrigues, A. Kuehl.		L; M; NRMP; W, S, C, E Groups	515-294-1458
Kao, Barfield, Lyons. 1975. National Symposium on Urban Hydrology & Sediment Control: On-site Sediment Filtration Using Grass Strips. University of Kentucky, Lexington, KY	article	GP; L; M; NRMP; D, REA	NYSDEC 6274 Avon-Lima Rd. Avon, NY 14414 (reproduction permitted)
King, Dennis M., Patrick T. Hagan, and Curtis C. Bohlen. Setting Priorities for Riparian Buffers: A Practical Framework for Comparing the Benefits and Costs of Vegetative Buffers. 1997. Univ. of MD CEES Technical Contribution Reference No. UMCEES-CBL-96-160.	research report	NRMP, M, W, S, C, E Groups	University of Maryland Center for Environmental and Estuarine Studies Solomons, MD 20688
Lalo, J.; K.J. Lutz. 1994. Corridor Management for Pastureland Streams.	booklet	GP; L; W, S, C, E Groups	PFBC 450 Robinson Lane Bellefonte, PA 16823 814-359-5185
Lowrance, R.; R. Leondard; J. Sheridan. 1985. Managing Riparian Ecosystems to Control Nonpoint Pollution. Journal of Soil and Water Conservation. 40(1)87-91.	article	M; NRMP; W, S, C, E Groups	NYSDEC (reproduction permitted)
Lowrance, R.; R. L. Todd; J. Fail, Jr.; O. Hendrickson; R. Leondard; L. Asmussen. 1984. Riparian Forests as Nutrient Filters in Agricultural Watersheds.	article	L; NRMP	NYSDEC
Montgomery County Planning Commission. 1996. Guidebook for Riparian Corridor Preservation. Norristown, PA.	55 page booklet	GP; NRMP; M, D, REA; W, S, C, E Groups	610-278-3722 $6/copy

Table 3. (Continued)

Reference/Author/Content	Format	Audience	Contact/Cost
Natural Lands Trust. April 1997. Growing Greener: Putting Conservation into Local Codes. Media, PA	16 page brochure	GP, L, M, D, REA, NRMP	610-353-5587, e-mail: natlands@pond.com
NY Department of Environmental Conservation. Riparian Management: A Flood Control Prespective.	Article	GP; L; M; NRMP; D, REA; W, S, C, E Groups	NYSDEC
NRCS/RCS. August 1996. Riparian Areas: Environmental Uniqueness, Functions & Values.	Fact sheet	GP; L; M; NRMP; D, REA; W, S, C, E Groups	NYSDEC (reproduction permitted)
Nutrient Subcommittee of the Chesapeake Bay Program, Forestry Workgroup. 1996. Forest and Riparian Buffer Conservation. Local Case Studies from the Chesapeake Bay Program. U.S. Department of Agriculture.	103 page booklet	M; NRMP; W, S, C, E Groups	1-800-662-CRIS or 1-800-YOUR-BAY
Palone, R.S., and A.H. Todd (eds.). 1997. Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers. Chesapeake Bay Program, and Northeastern Area State and Private Forestry. 1-800-662-2747 OR 1-800-YOUR-BAY or USDA Forest Service at 304-285-1592. Pub. NA-TP-02-97.	3-ring binder	GP; NRMP; W, S, C, E Groups	Out-of-print; Photocopies available
Pennsylvania Assoc. of Conservation Districts, Inc., Keystone Chapter, Soil and Water Conservation Society, Pennsylvania Department of Environmental Protection, and Natural Resources Conservation Service. 1998. Pennsylvania Handbook of Best Management Practices for Developing Areas. Prepared by CH2MHill.	3-hole punched pages (binder may be ordered)	L, M, D, REA, NRMP, W, S, C, E Groups	Pennsylvania Association of Conservation Districts 225 Pine St., Harrisburg, PA 17101. 717-236-1006 $25.00
Peterson, Susan C. and Kenneth D. Kimball. 1995. A Citizens Guide to Conserving Riparian Forests.	82 pages	GP, L, W, S, C, E Groups	River Network, P.O. Box 8787, Portland, OR 97207-8787. 503-241-3506 $7.00

Table 3 (Continued)

Reference/Author/Content	Format	Audience	Contact/Cost
Platts, USDA Forest Service. March 1981. Effects of Sheep Grazing on a Riparian-Stream Environment. Research Note INT-307. (DEC Source).	Article	L; NRMP; W, S, C, E Groups	NYSDEC (reproduction permitted)
Penn State College of Agricultural Sciences. 1996. Best Management Practices for Pennsylvania Forests. 10M996cp.	48 page booklet	NRMP; L	814-865-6713
Schultz, R. C.; J. P. Colletti and R. R. Faltonson. 1995. Agroforestry Opportunities for the United States of America. Agroforestry Systems 31:117-132.	journal article	M; W, S, C, E Groups	
Schultz, R. C.; J. P. Colletti; T. M. Isenhart; W. W. Simpkins; C. W. Mize and M. L. Thompson. 1995. Design and Placement of a Multi-species Riparian Buffer Strip System. Agroforestry Systems 29:201-226.	journal article	L; M; NRMP; D, REA; W, S, C, E Groups	
Sweeney, B.W. 1992. Streamside Forests and the Physical, Chemical, and Trophic Characteristics of Piedmont Streams in Eastern North America. Wat. Sci. Tech. 26(12):2653-2673.	journal article	GP; NRMP	Stroud Water Research Center, 970 Spencer Road, Avondale, PA 19311 610-268-2153
Tennessee Valley Authority. Banks & Buffers: A Guide to Selecting Native Plants for Streambanks and Shorelines.	Guide, booklet & CD-ROM	GP, L, M, D, NRMP, Nurseries, Landscape Business	Tennessee Valley Authority 423-751-7338 $30.00
Thorne, S.F., D.C. Kim, K.C. Steiner (co-directors), & B.J. McGuinness (ed.). 1995. A Heritage for the 21st Century: Conserving Pennsylvania's Native Biological Diversity. PA Fish & Boat Comm.	72 page booklet	GP, L, M, D, NRMP, W, S, C, E Groups	Joy Drohan, PA State U., 125 Land & Water Bldg., Univ. Park, PA 16802 814/863-0037
U. S. Army Engineer Waterways Experiment Station. 1983. Streambank Protection Guidelines - for Local Governments. Vicksburg, MS 39810.		L; M; W, S, C, E Groups	
USDA NRCS. Showcase & Protect Your Riparian Buffer Strips. Poster and Q&A Sheet on the National Conservation Buffer Initiative. 717-782-2202.	Poster & fact sheet	GP; L; M; NRMP	USDA Soil Conservation Service Suite 340, 1 Credit Union Place Harrisburg, PA 17110

Table 3. (Continued)

Reference/Author/Content	Format	Audience	Contact/Cost
USDA Forest Service. Riparian Forest Buffers - Function and Design for Protection and Enhancement of Water Resources. David Welsch, Pub. No. NA-PR-07-91. USDA Forest Service, NE Area, Radnor, PA.	20 page booklet	L; M; NRMP; D, REA; W, S, C, E Groups	Super. Of Doc. 202-512-1800 #001-001-00657-2 $2/copy
University of Maryland Cooperative Extension Service. Riparian Forest Buffers: The Link Between Land and Water. Video.	21 minute video	GP	410-827-8056 $15/copy/Also available from PA Coop. Ext. Service
University of Maryland Cooperative Extension Service. U.S. Fish & Wildlife. 1988. Streamside Forests: The Vital, Beneficial Resource.	16 page booklet	GP	410-827-8056 MD Ext. Service or 410-573-4500 USFWS
University of Minnesota Distribution Center. January 1996. At the Water's Edge: The Science of Riparian Forestry. 20 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108-6069. 612-625-8173.	Book/ conference proceedings	M; NRMP; W, S, C, E Groups	U. of Minn. Distribution Center
The Izaak Walton League of America. No Date. A Citizen's Streambank Restoration Handbook.	111-page book	GP; NRMP; W, S, C, E Groups	Save Our Streams Program Izaak Walton League of America, 707 Conservation Lane, Gaithersburg, MD 20870-2983. $18.00 (800) BUG-IWLA
Wohl, N. E. and R. F. Carline. Canadian Journal of Fisheries and Aquatic Sciences 53 (Supplement 1): 260-266. Relations among riparian grazing, sediment loads, macroinvertebrates, and fishes in three central Pennsylvania streams.	journal article		

KEY TO ABBREVIATIONS:
GP - General Public
L - Landowner
M, D, REA - Municipalities, Developers, Real Estate Agents
NRMP - Natural Resource Management Professionals
W, S, C, E Groups - Watersheds, Sportsmen, Conservation and Environmental Groups

[Attachment will be inserted, starting on new page - Pennsylvania Stream ReLeaf Project Data Entry Form - 4 pages, including PA watersheds map]

APPENDIX A

PENNSYLVANIA AGENCY COMMITMENTS

- **DEP** will coordinate with other agencies, programs and the public by organizing and maintaining a database and reporting information, as well as convening committees needed to pursue specific tasks and by pursuing sources of funding.
- **DCNR** will promote the initiative through State Park management efforts and educational opportunities, through its Forest Stewardship Program, and through its Recreation and Conservation programs, including Community Grants, Rivers Conservation Grants, Rails-to-Trails Grants and Heritage Parks. In addition, each of DCNR's 16 Service Foresters has committed to restoring 2.5 miles of forested streamside buffer annually through working with landowners in their districts.
- **The Department of Education** will incorporate streamside buffer restoration and conservation into its standards, curricula and educational materials that are provided to schools and teachers through Office of Environment and Ecology activities and programs.
- **The Center for Local Government Services, Department of Community and Economic Development**, will provide assistance to communities for streamside buffer restoration and conservation.
- **The Department of Corrections'** community work crews can provide labor within a designated radius of a corrections facility. Additionally, the Department will implement a demonstration project on its Camp Hill property.
- **The Department of Transportation** will incorporate streamside buffer restoration and conservation into its Maintenance Manual and design policies, and will review wetland mitigation and banking procedures for applicability to streamside forest buffers in the Chesapeake Bay watershed.
- **The Department of Labor and Industry** will provide labor through its Pennsylvania Conservation Corps.
- **The Turnpike Commission** will incorporate buffer restoration and conservation into its maintenance program.
- **The Department of Agriculture** will provide educational materials and expertise in areas of plant selection, noxious weeds, sustainable agriculture and animal health.
- **The Fish and Boat Commission** will provide encouragement and expertise to landowners and groups through its ongoing fisheries habitat improvement programs, by providing expertise through its Regional Habitat Managers, and through its recommendations associated with water obstruction and encroachment permits.
- **The Game Commission** will promote streamside wildlife habitat protection through its existing gamelands management activities, their stream bank fencing program and cooperative public access programs; additionally, seedlings are potentially available through the Howard Nursery and seedling program.

[to be inserted, new page - **APPENDIX B -** map and list - each 1 page]

STATE WATER PLAN WATERSHEDS IN PENNSYLVANIA

State Water Plan Subbasin	Watershed Name (Name of Major Stream)
Upper Delaware	
01A	Shehawken - Rattlesnake Creek
01B	Lackawaxen River
01C	Wallenpaupack Creek
01D	Shohola - Bushkill Creeks
01E	Brodhead Creek
01F	Jacoby - Bushkill Creeks
Central Delaware	
02A	Upper Lehigh River
02B	Middle Lehigh River
02C	Lower Lehigh River
02D	Cooks - Tohickon Creeks
02E	Pidcock - Mill Creeks
02F	Neshaminy Creek
Lower Delaware	
03A	Upper Schuylkill River
03B	Maiden Creek
03C	Tulpehocken Creek
03D	Manatawny - French Creeks
03E	Perkiomen Creek
03F	Lower Schuylkill River
03G	Darby - Crum Creeks
03H	Brandywine Creek
03I	White Clay Creek
03J	Poquessing - Pennypack Creeks
Upper Susquehanna	
04A	Tioga - Cowanesque Rivers
04B	Wappasening Creek - Chemung River
04C	Sugar - Towanda Creek
04D	Wysox - Wyalusing Creek
04E	Great Bend Susquehanna River
04F	Tunkhannock Creek
04G	Mehoopany - Bowman Creeks

State Water Plan Subbasin	Watershed Name (Name of Major Stream)
Upper Central Susquehanna	
05A	Lackawanna River
05B	Toby - Wapwallopen Creeks
05C	Fishing Creek
05D	Nescopeck Creek
05E	Catawissa - Roaring Creeks
Lower Central Susquehanna	
06A	Penns - Middle Creek
06B	Mahanoy - Shamokin Creeks
06C	Mahantango - Wiconisco Creeks
Lower Susquehanna	
07A	Shermans Creek
07B	Conodoguinet Creek
07C	Clark - Paxton Creeks
07D	Swatara Creek
07E	Yellow Breeches Creek
07F	Conewago Creek
07G	Chickies Creek
07H	Codorus Creek
07I	Kreutz - Muddy Creeks
07J	Conestoga River
07K	Pequea - Octorara Creeks
Upper West Branch Susquehanna	
08A	Sinnemahoning Creek
08B	Chest - Anderson Creeks
08C	Clearfield Creek
08D	Moshannon - Mosquito Creek
Central West Branch Susquehanna	
09A	Pine Creek
09B	Kettle - McElhattan Creeks
09C	Bald Eagle Creek

State Water Plan Subbasin	Watershed Name (Name of Major Stream)
Lower West Branch Susquehanna	
10A	Antes -Rattlesnake Creek
10B	Loyalsock Creek
10C	White Deer - Buffalo Creeks
10D	Muncy - Chillisquaque Creeks
Upper Juniata	
11A	Frankstown Branch - Little Juniata River
11B	Crooked - Standing Stone Creeks
11C	Dunning Creek
11D	Raystown Branch Juniata River
Lower Juniata	
12A	Kishacoquillas - Jacks Creek
12B	Tuscarora Creek
12C	Aughwick Creek
Potomac	
13A	Wills - Town Creeks
13B	Licking - Tonoloway Creeks
13C	Conococheague - Antietam Creek
13D	Marsh - Rock Creeks
Genesee	
14	Genesee River
Lake Erie	
15	Lake Erie
Upper Allegheny	
16A	Upper French Creek
16B	Kinzua - Brokenstraw Creeks
16C	Potato - Oswago Creeks
16D	Lower French Creek
16E	Oil Creek
16F	Tionesta Creek
16G	Sandy Creek

State Water Plan Subbasin	Watershed Name (Name of Major Stream)
Central Allegheny	
17A	Upper Clarion River
17B	Lower Clarion River
17C	Redbank Creek
17D	Mahoning Creek
17E	Cowanshannock - Crooked Creeks
Lower Allegheny	
18A	Lower Allegheny River
18B	Kiskiminetas River
18C	Loyalhanna Creek
18D	Conemaugh River - Blacklick Creek
18E	Stony Creek River
18F	Buffalo Creek

State Water Plan Subbasin	Watershed Name (Name of Major Stream)
Monongahela	
19A	Turtle Creek
19B	Tenmile Creek
19C	Middle Monongahela River
19D	Lower Youghiogheny River
19E	Upper Youghiogheny River
19F	Casselman River
19G	Upper Monongahela River

State Water Plan Subbasin	Watershed Name (Name of Major Stream)
Ohio	
20A	Shenango River
20B	Beaver River
20C	Slippery Rock Center
20D	Raccoon Creek
20E	Wheeling - Buffalo Creeks
20F	Chartiers Creek
20G	Upper Ohio River

APPENDIX C

CONTACTS FOR ASSISTANCE:

Pennsylvania Department of Environmental Protection
Bureau of Watershed Conservation, Watershed Management
P.O. Box 8555
Harrisburg, PA 17105-8555
phone: 717-787-5259

Pennsylvania Department of Conservation and Natural Resources
Bureau of Forestry, Forest Advisory Services
P.O. Box 8552
Harrisburg, PA 17105-8552
phone: 717-787-2106

DCNR FOREST DISTRICTS

#1 MICHAUX
District Forester
10099 Lincoln Way East
Fayetteville, PA 17222
717-352-2211 or **2260**
FAX: 717-352-3007

#2 BUCHANAN
District Forester
RR 2, Box 3
McConnellsburg, PA 17233-9503
717-485-3148
FAX: 717-485-9283

#3 TUSCARORA
District Forester
RD 1, Box 42-A
Blain, PA 17006
717-536-3191
FAX: 717-536-3335

#4 FORBES
District Forester
PO Box 519
Laughlintown, PA 15655
724-238-9533
FAX: 724-238-9827
Del: Rt. 30E

#5 ROTHROCK
District Forester
PO Box 403, Rothrock Lane
Huntingdon, PA 16652
814-643-2340
FAX: 814-643-6304

#6 GALLITZIN
District Forester
P.O. Box 506
155 Hillcrest Drive
Ebensburg, PA 15931
814-472-1862
FAX: 814-472-1876

#7 BALD EAGLE
District Forester
Box 147
Laurelton, PA 17835
717-922-3344
FAX: 717-922-4696
Del: RD 1, Millmont, PA 17845

#8 KITTANNING
District Forester
158 South Second Avenue
Clarion, PA 16214
814-226-1901
FAX: 814-226-1704

#9 MOSHANNON
District Forester
P.O. Box 952
Clearfield, PA 16830
814-765-0821
FAX: 814-765-0621
Del: RR1, Penfield, PA 15849

#10 SPROUL
District Forester
HCR 62, Box 90
Renovo, PA 17764
717-923-6011
FAX: 717-923-6014

#11 LACKAWANNA
District Forester
401 Samters Building
101 Penn Avenue
Scranton, PA 18503
717-963-4561 or **4564**
FAX: 717-963-3048

#12 TIADAGHTON
District Forester
423 E. Central Avenue
S. Williamsport, PA 17701
717-327-3450
FAX: 717-327-3444

#13 ELK
District Forester
RD 1, Rt. 155, PO Box 327
Emporium, PA 15834
814-486-3353
FAX: 814-486-5630

#14 CORNPLANTER
District Forester
323 N. State Street
North Warren, PA 16365
814-723-0262
FAX: 814-723-0270

#15 SUSQUEHANNOCK
District Forester
3150 E. Second St.
P.O. Box 673
Coudersport, PA 16915-0673
814-274-3600
FAX: 814-274-7459
Del: Route 6 East, Denton Hill

#16 TIOGA
District Forester
One Nessmuk Lane
Wellsboro, PA 16901
717-724-2868
FAX: 717-724-6575

#17 VALLEY FORGE
District Forester
845 Park Road
Elverson, PA 19520-9523
610-582-9660
FAX: 610-582-9692

#18 WEISER
District Forester
Box 99
Cressona, PA 17929
717-385-7800
FAX: 717-385-7804
Del: Route 901, Gordon Nagle Tr

#19 DELAWARE
District Forester
HC 1 Box 95A
Swiftwater, PA 18370-9723
717-895-4000 or **4001**
FAX: 717-895-4041

#20 WYOMING
District Forester
RD 2, Box 47
Bloomsburg, PA 17815
717-387-4255
FAX: 717-387-4298
Del: Arbutus Park Road

PENN NURSERY
District Forester
RD 1, Box 127
Spring Mills, PA 16875
814-364-5150
FAX: 814-364-5152
Del: Rte. 322 S. of
Potters Mills, PA

CONSERVATION DISTRICTS

County	Address and Phone Number
ADAMS	57 N. Fifth Street, Gettysburg, PA 17325 Phone 717-334-0636, FAX 717-334-5999
ALLEGHENY	Lexington Technology Park, Bldg. #1, Ste. 102, 400 N. Lexington Avenue Pittsburgh, PA 15208 Phone 412-241-7645, FAX 412-242-6165
ARMSTRONG	Armsdale Administration Bldg., RR #8, Box 294, Kittanning, PA 16201 Phone 724-548-3425 or 548-3428, FAX 724-548-3413
BEAVER	1000 Third Street, Ste. 202, Beaver, PA 15009-2026 Phone 724-774-7090, FAX 724-774-9421
BEDFORD	Fairlawn Court, Ste. 4, 702 W. Pitt Street, Bedford, PA 15522 Phone 814-623-6706 and 814-623-8099, FAX 814-623-0481
BERKS	Agricultural Center, 1238 County Welfare Road, Leesport, PA 19533-0520 Phone 610-372-4657, FAX 610-478-7058
BLAIR	1407 Blair Street, Hollidaysburg, PA 16648 Phone 814-696-0877, FAX 814-696-9981
BRADFORD	Stoll Natural Resource Ctr., R.R. 5, Box 5030-C, Towanda, PA 18848 Phone 717-265-5539, FAX 717-265-7435
BUCKS	924 Town Center, New Britain, PA 18901-5182 Phone 215-345-7577, FAX 215-345-7584

County	Address and Phone Number
BUTLER	122 McCune Drive, Butler, PA 16001-6501 Phone 724-284-5270 or 284-5271, FAX 724-285-5515
CAMBRIA	401 Candlelight Dr., Ste. 221, Ebensburg, PA 15931 Phone 814-472-2120, Ext. 588, FAX 814-472-7425
CAMERON	416 N. Broad Street, Emporium, PA 15834 Phone 814-486-2244, FAX 814-486-3802
CARBON	5664 Interchange Road, Lehighton, PA 18235-5114 Phone 610-377-4894, FAX 610-377-5549
CENTRE	414 Holmes Ave., Ste. 4, Bellefonte, PA 16823 Phone 814-355-6817, FAX 814-355-7914
CHESTER	Government Services Center, 601 Westtown Rd., Ste. 395, West Chester, PA 19382-4519 Phone 610-696-5126 or 610-436-9182, FAX 610-696-4659
CLARION	R.R. 3, Box 265, Clarion, PA 16214 Phone 814-226-7893, FAX 814-226-7893
CLEARFIELD	650 Leonard Street, Clearfield, PA 16830 Phone 814-765-2629, FAX 814-765-1336
CLINTON	36 Spring Run Rd., Rm. 104, Mill Hall, PA 17751-9543 Phone 717-726-3196, Ext. 204, FAX 717-726-7977

County	Address and Phone Number
COLUMBIA	702 Sawmill Rd., Ste. 105, Bloomsburg, PA 17815 Phone 717-784-1310, FAX 717-784-3247
CRAWFORD	1012 Water St., Ste. 18, Meadville, PA 16335 Phone 814-724-1793, FAX 814-337-7751
CUMBERLAND	43 Brookwood Ave., Ste. 4, Carlisle, PA 17013-9172 Phone 717-240-7812, FAX 717-240-7813
DAUPHIN	1451 Peters Mountain Rd., Dauphin, PA 17018 Phone 717-921-8100, FAX 717-921-8276
DELAWARE	Rose Tree Park Hunt Club, 1521 N. Providence Rd., Media, PA 19063 Phone 610-892-9484, FAX 610-892-9622
ELK	Elk Co. Courthouse Annex, 300 Center St., Ridgway, PA 15853 Phone 814-776-5373, FAX 814-776-5379
ERIE	12723 Route 19, P.O. Box 801, Waterford, PA 16441 Phone 814-796-4203, FAX 814-796-2833
FAYETTE	10 Nickman Plaza, Lemont Furnace, PA 15456 Phone 724-438-4497, FAX 724-437-2914
FOREST	P.O. Box 456, Tionesta, PA 16353 Phone 814-755-3450, FAX 814-755-8837
FRANKLIN	Administrative Annex, 218 N. Second St., Chambersburg, PA 17201-0909 Phone 717-264-8074, Ext. 203, FAX 717-263
FULTON	216 N. Second St., McConnellsburg, PA 17233 Phone 717-485-3547 or 717-485-4423, FAX 717-485-4115

County	Address and Phone Number
GREENE	Greene County Office Bldg., 93 E. High St., Rm. 215 Waynesburg, PA 15370-1839 Phone 724-852-5278, FAX 724-852-2944
HUNTINGDON	R.R. 1, Box 7C, Huntingdon, PA 16652-9603 Phone 814-627-1627, FAX 814-627-6831
INDIANA	Ag. Service Center, 251 Rt. 286 N., Indiana, PA 15701-9203 Phone 724-463-7702, FAX 724-463-1939
JEFFERSON	180 Main St., Brookville, PA 15825 Phone 814-849-7463, FAX 814-849-0825
JUNIATA	R.R. 3, Box 302, Mifflintown, PA 17059 Phone 717-436-6919, FAX 717-436-9128
LACKAWANNA	395 Bedford Street, Clarks Summit, PA 18411 Phone 717-587-2607, FAX 717-586-2637
LANCASTER	Farm and Home Center, 1383 Arcadia Rd., Rm 6, Lancaster, PA 17601 Phone 717-299-5361, FAX 717-299-9459
LAWRENCE	County Government Center, 430 Court St., New Castle, PA 16101 Phone 724-652-4512, FAX 724-652-9646 (Commissioner's Office)
LEBANON	2120 Cornwall Rd., Ste. 5, Lebanon, PA 17042-9788 Phone 717-272-3908, Ext. 3, FAX 717-272-5314
LEHIGH	Lehigh Co. Ag. Center, 4184 Dorney Park Rd., Ste 102 Allentown, PA 18104-5728 Phone 610-391-9583 or 610-820-3398, FAX 610-391-1131

County	Address and Phone Number
LUZERNE	Smith Pond Road, P.O. Box 250, Lehman, PA 18627-0250 Phone 717-674-7991, FAX 717-674-7989
LYCOMING	2130 County Farm Rd., Ste. 6, Montoursville, PA 17754 Phone 717-433-3003, FAX 717-433-3907
MCKEAN	Box E, Custer City, PA 16725 Phone 814-368-9960
MERCER	747 Greenville Road, Mercer, PA 16137-5023 Phone 724-662-2242, FAX 724-662-3905
MIFFLIN	20 Windmill Hill #4, Burnham, PA 17009 Phone 717-248-4695, FAX 717-248-6589
MONROE	8050 Running Valley Road, Stroudsburg, PA 18360 Phone 717-629-3060, FAX 717-629-3063
MONTGOMERY	1015 Bridge Road, Ste. B, Collegeville, PA 19426 Phone 610-489-4506, FAX 610-489-2159
MONTOUR	112 Woodbine Lane, Ste. 2, Danville, PA 17821 Phone 717-271-1140, FAX 717-271-3099
NORTHAMPTON	Greystone Building, Gracedale Complex, Nazareth, PA 18064-9211 Phone 610-746-1971, FAX 610-746-1926
NORTHUMBERLAND	R.R. 3, Box 238-C, Sunbury, PA 17801 Phone 717-988-4224, FAX 717-988-4488

County	Address and Phone Number
PERRY	31 W. Main Street, P.O. Box 36, New Bloomfield, PA 17068 Phone 717-582-8988, FAX 717-582-3771
PIKE	HC 6, Box 6770, Hawley, PA 18428-9016 Phone 717-226-8220, FAX 717-226-8222
POTTER	107 Market St., Coudersport, PA 16915 Phone 814-274-8411, FAX 814-274-0396
SCHUYLKILL	1206 Ag. Center Drive, Pottsville, PA 17901 Phone 717-622-3742 or 717-622-3744, FAX 717-622-4009
SNYDER	403 W. Market Street, Middleburg, PA 17842-1038 Phone 717-837-0085, Ext. 203, FAX 717-837-3000
SOMERSET	North Ridge Bldg., Ste. 103, 1590 N. Center Ave., Somerset, PA 15501 Phone 814-445-4652, FAX 814-443-1592
SULLIVAN	R.R. 4, Box 4181, Dushore, PA 18614 Phone 717-924-3178, FAX 717-924-4372
SUSQUEHANNA	County Office Building, 31 Public Avenue, Montrose, PA 18801 Phone 717-278-4600, Ext. 280, FAX 717-278-4098
TIOGA	5 East Avenue, Wellsboro, PA 16901 Phone 717-724-1801, FAX 717-724-6542
UNION	60 N. Bull Run Crossing, Lewisburg, PA 17837-9700 Phone 717-523-8782, FAX 717-524-2536

County	Address and Phone Number
VENANGO	Two Mile Run County Park, R.R. 5, Box 320, Franklin, PA 16323 Phone 814-676-2832, FAX 814-676-2927
WARREN	609 Rouse Ave., Ste. 203, Youngsville, PA 16371 Phone 814-563-3117, FAX 814-563-3412
WASHINGTON	100 W. Beau St., Ste. 602, Washington, PA 15301 Phone 724-228-6774, FAX 724-223-4682
WAYNE	470 Sunrise Avenue, Honesdale, PA 18431 Phone 717-253-0930, FAX 717-253-9741
WESTMORELAND	Donohoe Center, R.R. 12, Box 202B, Greensburg, PA 15601 Phone 724-837-5271, FAX 724-837-4127
WYOMING	One Hollowcrest Complex, Tunkhannock, PA 18657 Phone 717-836-2589 or 717-836-2993, FAX 717-836-6063
YORK	118 Pleasant Acres Road, York, PA 17402 Phone 717-840-7430, FAX 717-755-0301

Extension Urban Foresters

These contacts work on a municipal and community basis:

Northwestern Counties
Scott Sjolander
Crawford County Cooperative Extension Office
R.D. #2, Box 825-B
Meadville, PA 16335
phone: 814/333-7460

Southwestern Counties
Mark Remcheck
Washington County Cooperative Extension Office
Room 601
Courthouse Square
Washington, PA 15301
phone 412/228-6881

Central Counties:
William Elmendorf
Pennsylvania State University
108 Ferguson Building
University Park, PA 16802
phone: 814/863-7941

Northeastern Counties
Vince Cotrone
16 Luzurne Avene
Suite 200
West Pittston, PA 18643-2817
phone: 717/825-1701

Southeastern Counties
Julianne Schieffer
Montgomery County Cooperative Extension Office
Suite H
1015 Bridge Road
Collegeville, PA 19426-1179
phone: 610/489-4315

Pennsylvania Stream ReLeaf
Comments on the Draft Plan, and Responses

DEP received input on the draft plan from a diversity of sources, including nonprofit organizations, farmers, universities, builders' representatives, forestry representatives, consultants, and other government agencies. Straight-forward corrections and many suggestions for strengthening presented information were incorporated into the text. The steering committee reviewed other comments that would require changes in the approach or philosophy it first established for this initiative. Their guidance on these issues is reflected in the responses below.

Comment: DEP received several comments questioning the streamside buffer widths recommended for restoration and conservation.

Response: The Chesapeake Bay Program issued carefully-considered non-regulatory *guidance* on the widths to be used for streamside buffer restoration and conservation. It is based on research results, the need to provide flexibility depending on site conditions, and standards already in use by agencies that provide technical assistance to landowners. It is:

For restoration -

- In all cases, buffer widths of 50-100 feet will be promoted as the appropriate width for optimizing a range of multiple objectives for water quality and fish habitat improvement. Increasing widths to encompass the geomorphic floodplain is likewise desirable in order to optimize flood reduction benefits. Widths of up to 300 feet may be recommended to ensure values related to some wildlife habitat and use as migration corridors. "Buffer averaging", the practice of expanding and contracting buffer widths in order to account for stream channel meandering and efficiency of protection measures (such as fences) is acceptable.
- The width included for tracking purposes to meet the 2010 goal will be 35 feet or greater, measured from the top of the bank or level of bank full discharge. Individual jurisdictions may choose to apply greater widths in specific situations or to meet predetermined needs. The NRCS [Natural Resources Conservation Service] Standard provides guidance on variable widths from 35-100 feet. When applied on agricultural or urban lands, an additional grass filter strip (of 25 feet or greater) is recommended upslope to improve and sustain pollutant removal performance.

For conservation -

- A conservation width of at least 100 feet on each side is recommended for retention of existing riparian forests. Individual jurisdictions may choose to apply different widths in specific situations or to meet predetermined local needs.

Pennsylvania's goal is to encourage as wide a buffer as feasible through voluntary means. We recognize that, depending on the situation, a buffer may provide some benefit even if it is narrower than 100 feet or even 35 feet. Within the Chesapeake Bay watershed, only projects meeting the above criteria will be counted towards the 2,010 mile goal. We encourage landowners who cannot meet these criteria to restore and conserve whatever buffer they can, whether they are located within or outside of the Chesapeake Bay watershed.

Comment: Several comments recommended that the plan target areas or prioritize where and how streamside buffers are restored, both by watershed and within a particular watershed, so that available limited resources can be used most effectively.

Response: If Pennsylvania agencies established an order of priority by watershed, based on ongoing water quality programs, Pennsylvania Stream ReLeaf would then become an agency-dictated ("top-down") program. Rather, we believe strongly (with support from many who sent us comments) that this initiative's success depends heavily on a diversity of local efforts occurring across a wide geographic area.

The steering committee discussed prioritization several times during the plan's development. They concluded each time that Pennsylvania should encourage well-planned streamside buffer restoration wherever local and regional groups are willing to take the initiative. Active watershed groups know where their problems and opportunities lie, and many have ongoing activities that include streamside buffers. The committee is concerned that groups would be discouraged from participating in the initiative if the government tells them they have to wait in line. Grass-roots initiatives generally start diffusely until they establish momentum. The appropriate role of Pennsylvania agencies is to enable these local initiatives wherever possible.

Prioritization within a particular watershed will depend on the desired functions of the buffer or buffers. For example, buffers in headwaters streams may have the greatest water quality benefits, while those on larger streams may provide the greatest benefits for fish habitat. This approach, routinely presented at workshops dealing with streams and riparian corridors, will be included in educational materials and presentations developed for Stream ReLeaf. Individual site planning should coordinate as much as possible with watershed and local priorities.

Comment: Can DEP and DCNR provide field assistance to landowners for one more program with their current limited staff? Conservation Districts support the program, but will need more funding to take on another program.

Response: Our goal is to raise the awareness of streamside buffers' value so that everyone involved will appropriately incorporate their restoration and conservation into their planning and normal ongoing activities. This can happen if expertise in streamside buffer restoration and conservation is developed among professionals within the private sector, universities and watershed groups, as well as the conservation agencies. While funding may be available for specific projects, we do not currently envision funding this in the way we have funded programs formally delegated to conservation districts.

Comment: DEP received comments that streamside buffer restoration and conservation should be required by law, as in Canada. Conversely, some who commented are adamantly opposed to any regulatory requirements.

Response: Pennsylvania has not pursued a regulatory approach to this initiative because of local authority over land use and need for local decisions to ensure long-term buffer conservation. Many years can elapse between the time a bill is developed and introduced into the legislature, and implementing regulations are finally in place. Pennsylvania differs from many other states and countries in that its laws

enable local municipalities to make their own land use decisions. Therefore, in order to succeed in Pennsylvania, this initiative will need substantial local ownership and initiative. DCNR's Advisory Council supports this approach by commenting that "…available technical and financial support for the establishment and maintenance of riparian buffers will be much more of an inducement for the public to participate in this program in the long run than regulatory actions."

Comment: DEP received comments recommending the removal of references to regulating timber harvesting. These references occurred mainly in the draft recommendation regarding the 21st Century Environment Commission (addressing statewide mechanisms) and in the table on methods to conserve existing buffers (including local ordinances).

Response: The Steering Committee recommended that the plan not single out timber harvesting, which is only one activity of many that can affect riparian buffers. Instead, the plan should discuss available tools, including local ordinances, more generically. The Chesapeake Bay Program's Riparian Forest Buffer Panel acknowledged that local ordinances (such as zoning, subdivision, and stormwater management ordinances) are appropriate mechanisms to implement buffers in developed and developing areas, particularly if they provide consistent guidelines while remaining flexible and providing incentives. (The recommendation regarding the 21st Century Environment Commission was also revised to be more appropriate to their schedule and deadlines).

Comment: Add a recommendation promoting the use of voluntary best management practices in streamside buffer areas, such as through the Sustainable Forestry Initiative.

Response: We agree that best management practices should be encouraged and that involvement of the forestry industry in encouraging their use (such as through the Sustainable Forestry Initiative) is beneficial.

Comment: Farmers can ill afford to turn their best cropland into stream buffer and make do with fewer crops. If farmers are to participate in this worthwhile initiative, they must be able to make their remaining acreage more productive. The 35-foot wide buffer does not provide enough flexibility.

Response: The costs and benefits of restoring buffers on farms are highly specific to the individual farm and farmer. This initiative is voluntary, and incorporates a considerable amount of flexibility. Options may be available that can meet some stream protection goals along with the farmer's needs. Examples include providing narrower buffers, restoring them only on marginally productive lands or planting species that provide alternative crops such as forest products. In addition to technical assistance from agencies, self-help programs such as Farm-A-Syst can help farmers do their own evaluation of their properties.

Comment: The roles of various state agencies, commissions and other groups are not clearly identified in future actions. A lead agency or group with responsibility to carry out the action is rarely identified.

Response: As the lead agency for the initiative, DEP in cooperation with DCNR, will ensure that the various actions identified will be initiated. Additionally, the steering committee, consisting of many agency representatives, will continue to meet periodically to help oversee progress. The various committees that developed the plan have determined that this initiative requires grass-roots ownership and implementation to succeed in Pennsylvania. Participation by non-agency entities will be vital, and some of these may be most appropriate to assume leadership roles in key implementation activities.

Comment: The plan does not clearly identify mechanisms for tracking accomplishments, especially in the conservation goal. How will Pennsylvania track cost-share efforts or other federal, state and local agency efforts?

Response: Because of the grass-roots approach Pennsylvania has taken to developing the plan, some of the details of the tracking process must be determined by an implementation committee. Despite this, the essential elements to document progress are in place, or are planned for the near future. These include:

- establishing a database for restoration projects through existing information networks and the new data reporting form;
- agency participants on the continuing steering committee - these individuals provided some of the information listed on Table 1 of the plan, and will be key contacts for obtaining activity updates on their own cost-share programs; and
- contacts with watershed associations, other nonprofit organizations and municipalities likely to be involved in streamside buffer restoration and conservation.

Suggestions that DEP will bring before the implementation committee for their consideration include:

- The mailing list used to distribute the plan, which was sent out to more than 1500 organizations and individuals, could also be used to periodically mail out surveys to assess progress. This list could also serve as a basis for periodic telephone surveys.
- DEP will ask state agencies to report on progress annually through the steering committee.
- DEP can request regular reports from the cost-share programs likely to be most heavily used for streamside buffers.
- DEP can integrate streamside buffers with ongoing plans for a watershed workshop where groups would have the opportunity to highlight their projects and share information.
- Existing intermunicipal networks will be used to share information with municipalities, and to obtain information from them concerning tools they are using for buffer restoration and conservation.

Comment: The plan provides only a limited description of the projects and programs which each of the state agencies have committed to complete. Pennsylvania should make a clear commitment to restoring and conserving streamside buffers on Commonwealth lands. Conversely – several commentors objected to the emphasis the plan placed on agency projects and programs. For example, the plan contains "…a good deal of agency positioning which was dull reading and might be of little use to the volunteer groups doing the work."

Response: The steering committee directed DEP to de-emphasize agency commitments, and emphasize an agency supporting role for local entities. For those who wish to see them, more detailed descriptions of agency commitments are available upon request from DEP's Bureau of Watershed Conservation. A number of agencies have committed to conserving and restoring streamside buffers on their lands. They have stated the need for appropriate staff training in order for this to occur. DEP will approach agencies that have not yet made this commitment.

Comment: This should not be an agricultural or forestry effort, but a natural heritage restoration effort.

Response: The significance of natural heritage restoration should be addressed in the intitiative's outreach and educational activities, emphasized wherever possible, and reinforced with lists of appropriate plant species and species combinations based on natural communities. However, a significant portion of Pennsylvania's land outside of urban/suburban areas is owned by those who depend upon agriculture and timbering for income. Restoration and conservation of *any* buffer on many properties will depend on the buffer's continuing ability to provide income from some type of crop or forest products. Natural community restoration can be held up as a goal, but economic returns realistically are a necessary part of the equation for many landowners. Melding the two will be one challenge for this initiative's implementation committees.

Comment: The importance of this initiative to water quality needs to be emphasized. Effects on water quality will need to be documented.

Response: The effectiveness of streamside buffers as best management practices for pollution control can be evaluated as part of DEP's ongoing water quality assessment programs, including the Citizens' Volunteer Monitoring Program. Unless a buffer is restored to ameliorate a severe polluted runoff problem, immediate water quality improvements downstream of a single small buffer restoration project may not be measurable. Long term water quality improvements will need to be evaluated on a watershed basis where buffer restoration is only one of perhaps many tools, and water quality improvement may be only one of several watershed management goals.

Comment: The plan does not demonstrate that 100 foot wide buffers provide additional vital benefits over 35 foot wide buffers.

Response: Research has shown that 100 foot wide buffers *and even wider* buffers can provide significant benefits over narrower buffers. Two keys to buffer effectiveness are site conditions and what the buffer is intended to achieve. For entry into the research literature on the subject of buffer widths, see the *Chesapeake Bay Riparian Handbook* and Correll, D.L. 1997. *Vegetated Stream Riparian Zones: Their*

Effects on Stream Nutrients, Sediments, and Toxic Substances. An Annotated and Indexed Bibliography. Smithsonian Environmental Research Center, Edgewater, MD (Internet address: www.serc.si.edu).

Comment: A major deficiency is that the plan does not identify how much of Pennsylvania's streambanks are now forested. How will you reach the initiative's goal if you don't know where you began? There is a need to inventory the conditions of all shorelines, banks, and buffers for all water bodies in the state, to know exactly what condition they are in and to set a basis or standard for measuring gains and losses.

Response: The technical advisory committee that developed the reporting and evaluation part of the plan did indeed recommend that a GIS (geographic information system) based map be developed for all of Pennsylvania that shows the status of streamside buffers. DEP has begun to investigate how such a map could be developed. Scale and cost are significant issues that must be addressed.

The initiative will need to rely on local data and knowledge, keeping in mind that the most important goal of Stream ReLeaf is to make buffer restoration and conservation a normal matter of course. Although measuring progress (which can be done by other means) is important, we cannot justify the costs and labor involved in developing a detailed GIS-based map, and using it to measure progress. Our current GIS indicates that Pennsylvania contains more than 83,000 miles of streams. Identifying streamside buffers narrower than 100 feet wide along both sides of this entire mileage would require considerable effort and time with current capabilities. We will continue to evaluate the situation, and will survey streamside buffers when feasible.

Comment: A long-range goal should be the involvement of all the bordering states located within the watersheds that include Pennsylvania.

Response: Agreed. We will continue to share information about this initiative with neighboring states, and will continue to coordinate with the other Chesapeake Bay jurisdictions.

Riparian area - "The area of land adjacent to streams, rivers, and other bodies of water that serves as a transition between aquatic and terrestrial environments and directly affects or is affected by that body of water."

Riparian forest buffer - " An area of trees, usually accompanied by shrubs and other vegetation, adjacent to a body of water and managed to maintain the integrity of stream channels and shorelines to 1) reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals, and 2) supply food, cover, and thermal protection to fish and other wildlife." (*Chesapeake Bay Riparian Handbook*: A guide for Establishing and Maintaining Riparian Forest Buffers)