

Commonwealth of Virginia

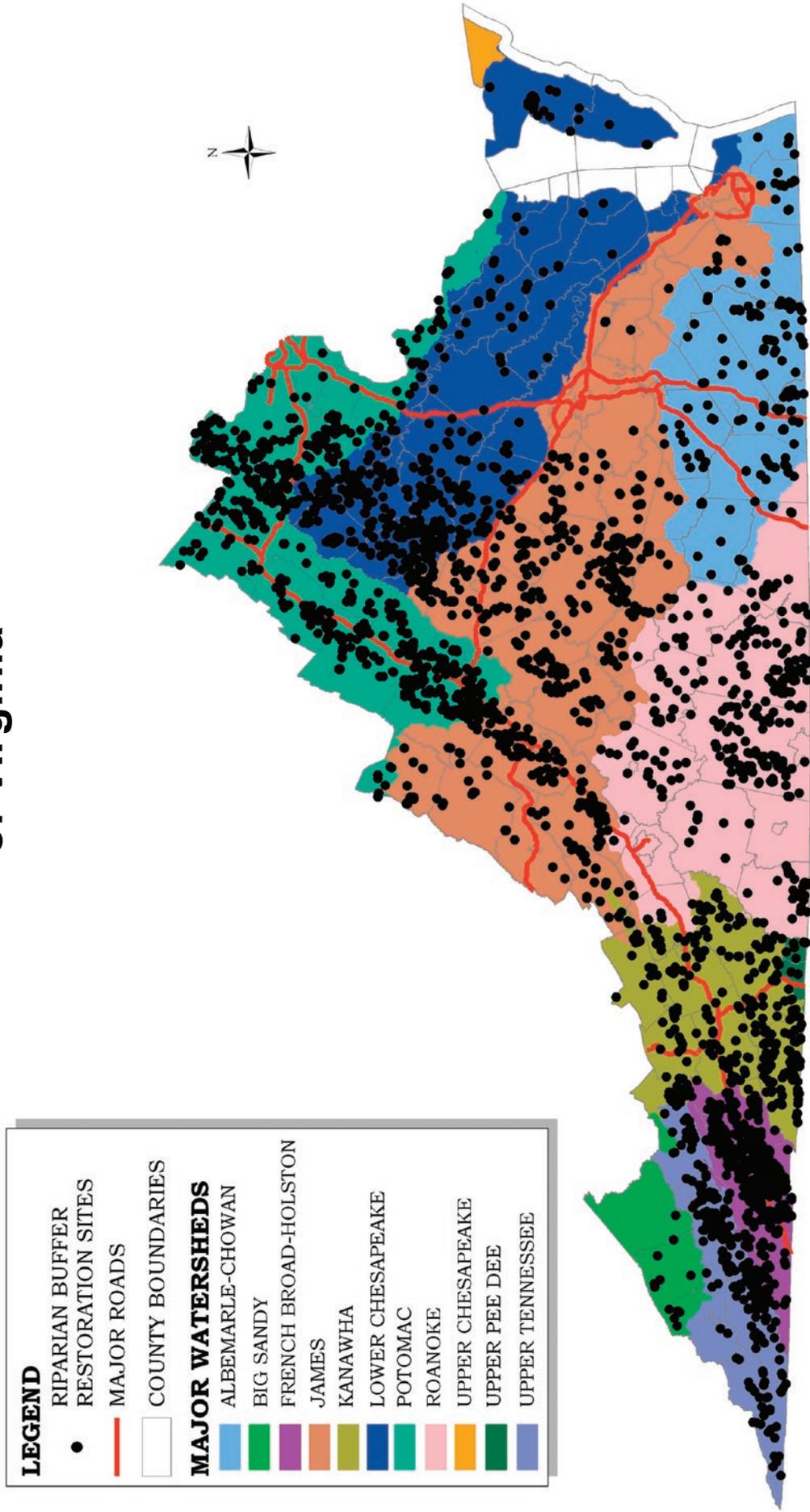
**Riparian
Forest Buffer
Implementation Plan
2006 – 2010**

Virginia Riparian Forest Buffer Panel
June 2007



Figure 1

Locations of Riparian Buffer Restoration Projects of Virginia



Based on April 9, 2007 Database

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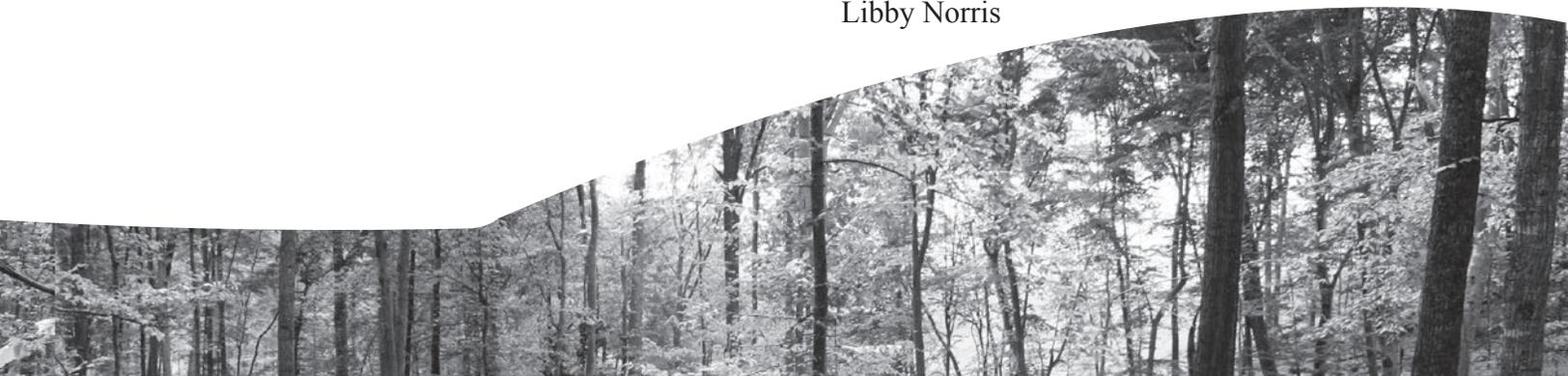
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Foreword

Riparian buffers – areas of trees, shrubs, or other vegetation adjacent to streams – play a significant role in conserving living resources and safeguarding water quality. Recognizing these environmental benefits, the multi-jurisdictional Chesapeake Bay Executive Council adopted Directive 94-1 in October 1994. This directive called on the Chesapeake Bay Program to develop a policy on riparian forest buffers. Following a two-year effort by a Panel representing many interests groups and experts, the Executive Council adopted several goals and policy recommendations to enhance stewardship of riparian areas. Specifically, the goals called for conserving existing riparian buffers and restoring 2,010 miles of new riparian forest buffers within the Bay watershed by the year 2010. Virginia’s commitment was to restore 610 miles of riparian forest buffers by 2010.



Specifically, the goals called for conserving existing riparian buffers and restoring 2,010 miles of new riparian forest buffers within the Bay watershed by the year 2010. Virginia’s commitment was to restore 610 miles of riparian forest buffers by 2010.

Virginia met its riparian buffer goal early, in 2002. As of June 2006, the state had restored 1,644 miles of riparian buffers in the Chesapeake Bay watershed and 1,227 in the state’s collective southern rivers watersheds. As a result of this early success and a call for an expanded riparian buffer goal in the Chesapeake 2000 Agreement, Gov. Warner and his counterparts on the Executive Council signed Directive 03-01 in December 2003, committing to 10,000 miles by 2010. Virginia’s share is 3,200 miles. The Executive Council further acknowledged, “We expect that additional miles will be added to our near term goal based on the [states’] tributary strategies.” As State Forester and Chair of the Virginia Riparian Forest Buffer Panel, I will take the lead in seeing that Virginia meets its 3,200-mile buffer restoration commitment and additional Tributary Strategy goals.

Thanks to the educational efforts of many Federal and state agency partners and stakeholders, as well as to advances in our scientific understanding of buffer functions, riparian buffers are being recognized for their ecological value and planted across the Commonwealth. We trust this implementation plan will promote further efforts to protect the Chesapeake Bay by conserving and restoring riparian forest and other buffers.



Carl E. Garrison JR

Carl Garrison, State Forester

Chair - Virginia Riparian Forest Buffer Panel

Executive Summary

The overall goal of the Virginia Riparian Buffer Implementation Plan is to ensure, to the extent feasible, that all streams and shorelines in the Commonwealth will be protected by adequate riparian buffers. This program has been and will continue to be implemented statewide. The agencies of the Commonwealth will work with interested organizations, businesses, and private landowners to establish, enhance, and maintain various kinds of riparian buffers, as appropriate for the setting and land use, with the recognition that forested buffers are the ideal. The Commonwealth's commitment to restore 3,200 miles of riparian forest buffers within Virginia's portion of the Chesapeake Bay watershed is an important subset of this overall plan. The following six major objectives and their associated strategies are highlighted in this updated plan to ensure the overall goal is achieved.

Objective 1 - Restore Missing or Inadequate Riparian Buffers

Strategies

- Increase technical assistance for buffer outreach and planning through new hires and the expanded use of current state employees
- Identify restoration sites including Total Maximum Daily Load (TMDL) impacted stream segments
- Continue to develop local watershed-based plans and partnerships for specific actions
- Establish education outreach to volunteer groups
- Provide sufficient planting stock from state nurseries
- Plant riparian buffers and provide maintenance and tracking information

Objective 2 - Conserve Existing Riparian Buffers

Strategies

- Encourage local requirements for restoration as a condition

for land conversion

- Encourage local commitments to prevent, or require mitigation for, clearing of buffers during development
- Tie buffer conservation and restoration to other forms of state and federal assistance
- Insert minimum conservation requirements in Farmland Protection Program
- Expand and strengthen the Bay Act
- Document riparian forest buffer conservation on State-owned lands and National Forests
- Identify riparian forest buffers in easements held by Land Trusts and Conservancies
- Track riparian forest buffers in easements due to local government tax breaks
- Track riparian forest buffers in easements through USDA programs
- Establish education outreach to volunteer groups and individual landowners
- Coordinate goals and priorities with state and local integrated watershed management programs

Objective 3 - Enhance Program Coordination and Accountability

Strategies

- Convene the Virginia Riparian Buffer Work Group on a quarterly basis
- Develop Memoranda of Agreement with non-government organizations
- Promote private sector involvement



- Develop a spot-check tracking database
- Establish a program to coordinate and support volunteer activities

Objective 4 - Enhance Incentives

Strategies

- Encourage counties to adopt existing legislation authorizing tax breaks for riparian forest buffer lands
- As applications are submitted, use Water Quality Improvement Fund money to reimburse localities for revenue losses due to riparian buffer land tax breaks
- Encourage tax credits for tree planting and other riparian conservation efforts
- Seek legislation to exempt riparian forest buffers from estate taxes
- Encourage localities to use stormwater utility fees for establishing riparian buffers
- Seek increased Conservation Reserve Enhancement Program (CREP) funds through the U.S. Department of Agriculture
- Enhance CREP funding towards forest buffers
- Increase the availability of riparian easements through CREP
- Optimize CREP to encourage tree planting on pastureland
- Consolidate and improve cost-share and grant programs
- Encourage flexibility in local zoning and subdivision requirements to retain riparian forest buffers
 - Promote expansion of local governments land-use management tools

- Seek increased funding for conservation easements through the Open Space Lands Preservation Trust Fund
- Explore small business assistance programs as funding sources
- Establish recognition programs for buffer conservation and restoration

Objective 5 - Promote Education and Outreach

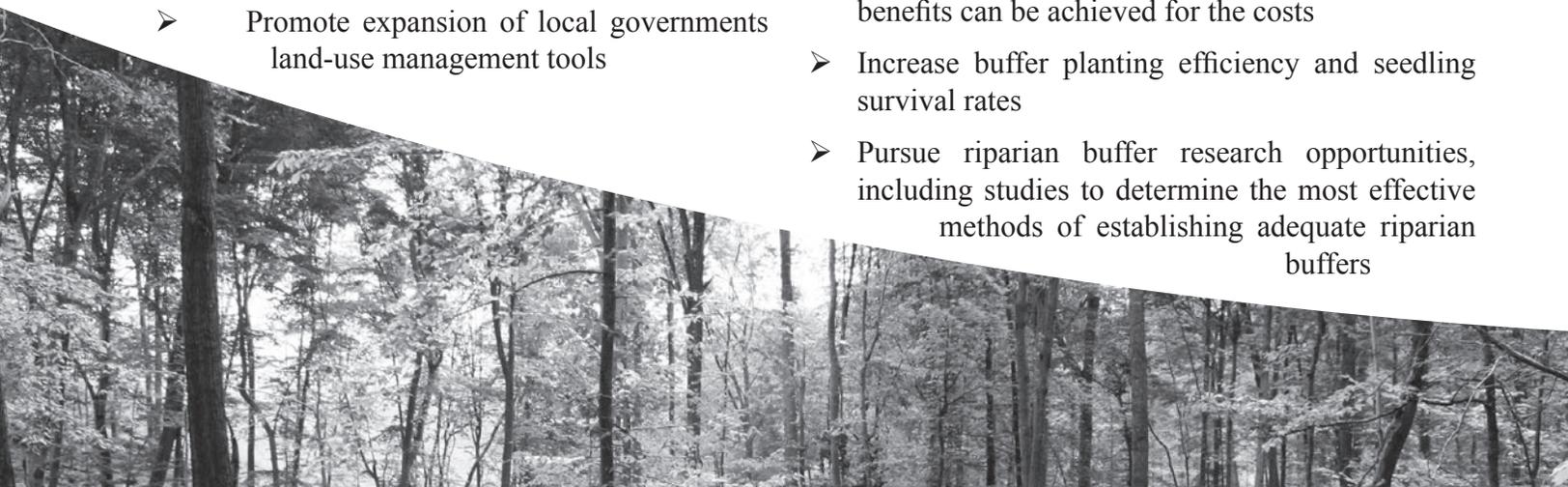
Strategies

- Initiate a major public relations campaign to promote the multiple benefits of buffers
- Promote private sector involvement
- Provide training for local groups
- Coordinate with youth/student education programs
- Promote activities of local watershed organizations
- Increase the number of demonstration areas in each tributary
- Provide public information through real estate companies and chambers of commerce
- Continue cross-training among participating state and Federal agencies
- Link riparian forest buffer restoration data with the Virginia Geographic Information Network

Objective 6 - Target, Track and Conduct Research

Strategies

- Target riparian buffer efforts where the greatest benefits can be achieved for the costs
- Increase buffer planting efficiency and seedling survival rates
- Pursue riparian buffer research opportunities, including studies to determine the most effective methods of establishing adequate riparian buffers



Historical Perspective

Careful stewardship of rivers and streams is essential to meeting the goals of restoring the Chesapeake Bay and its tributaries. Riparian buffers, particularly forest buffers, play a critical role in the landscape, protecting water quality by filtering runoff and removing nutrients and sediment; protecting living resources by supplying food, habitat and temperature-moderating shade; protecting the shoreline integrity from erosion impacts; and moderating flood damage.

Understanding these environmental benefits, the Chesapeake Bay Program convened a Riparian Forest Buffer Panel in 1994 chaired by the Virginia State Forester. The multi-jurisdictional panel was charged with developing policy to enhance conservation and restoration of riparian forest buffers in the Bay watershed. In November 1996, the Chesapeake Bay Executive Council adopted these goals for member states and Federal agencies:

- To assure, to the extent feasible, that all streams and shorelines will be protected by a forested or other riparian buffer
- To conserve and manage existing forests along all streams and shorelines
- To increase the use of all types of riparian buffers and restore riparian forest on 2,010 miles of stream and shoreline in the watershed by 2010, targeting efforts where they would be of greatest value to water quality and living resources

Also, the Executive Council adopted five policy recommendations:

- Enhance program coordination and accountability
- Promote private sector involvement
- Enhance incentives
- Support research, monitoring, and technology transfer
- Promote education and information

Each Bay Program partner agreed to develop an implementation plan for their respective governor by June 30, 1998, including benchmarks on how these goals and recommendations will be met. This revised implementation plan updates the original 1998 plan reflecting Virginia's progress to date, advances in the understanding of buffers and Bay conservation needs, current legislation and priorities, and a new buffer restoration goal.



Buffer Restoration Progress In Virginia

Virginia continues its efforts to restore riparian forest buffers throughout the Commonwealth. As of June 30, 2006 2,708 miles of buffers had been restored – 1,644 within the Chesapeake Bay watershed and 1,227 within the collective “Southern Rivers” watersheds. Figure 2 summarizes annual riparian buffer establishment for the Chesapeake Bay watershed and the Southern Rivers watersheds. Virginia’s Bay watershed goal of 610 miles by the year 2010 was met early. A new goal of 10,000 miles was established by the Bay-partner states with Virginia committing to 3,200 miles of that total.

Figure 1 (inside front cover) shows the locations of buffers installed across the state through April 2007.

The Conservation Reserve Enhancement Program (CREP), a Federal cost-share program that provides incentives to landowners to protect their streams, remains the most successful program in the state for promoting riparian forest buffer restoration as well as an example of successful state and Federal cooperation. Soil and Water District staff, NRCS staff, and Department of Forestry field staff continue to promote CREP and to provide private landowners with the necessary technical assistance to implement CREP projects. VVDOP continues to provide the bulk of planting stock for CREP projects. District, NRCS, and DCR staff handles most of the program administration. Continuation, if not expansion, of CREP in the 2007 Farm Bill will be critical if Virginia is to meet its 2010 buffer restoration goals.

Several ongoing efforts seek to identify and target those stream segments, including those listed as impaired under the Clean Water Act, most in need of buffer restoration. In addition to efforts on the part of Virginia’s natural resources agencies, university

research using remote sensing and geographic information systems have enabled agencies to target small watersheds where restoration is most critical to achieving Virginia’s water quality goals. Virginia’s Tributary Strategies program has driven this process in that portion of the state that falls within the Chesapeake Bay watershed in an effort to develop local watershed-based plans.

The conservation of existing riparian buffers will be crucial to the success of this implementation plan. Though the rate of loss of riparian forests is currently unknown, forests as a whole are being lost at a rate of more than 100 acres/day in the Bay watershed. Losses to development subtract from overall progress. Keeping existing mature buffers is a sensible strategy, one that is starting to be tracked by extent of riparian forest buffers placed in conservation status. Better efforts to coordinate the goals and priorities of the plan with state and local integrated watershed management programs will be required. In the long run, local government commitments to prevent clearing of, or require mitigation for, riparian forests during development, stormwater management, or transportation system construction will be essential.

The passage of the Water Quality Improvement Act in May 1999 established guidelines for model language about riparian buffers. A survey to identify land trusts/conservancies was completed in June 2001 with the formation of the Virginia United Land Trust and followed with the publication of a conservation plan for Virginia that discusses both riparian forest buffers and conservation easements. Efforts to document riparian buffer conservation on State and National Forest lands as well as to identify riparian buffers in easements held by land trusts and conservancies are ongoing. The Virginia Division of Natural Heritage has been given the task of tracking Virginia’s miles of conserved riparian buffers, including buffers in easements through USDA programs.

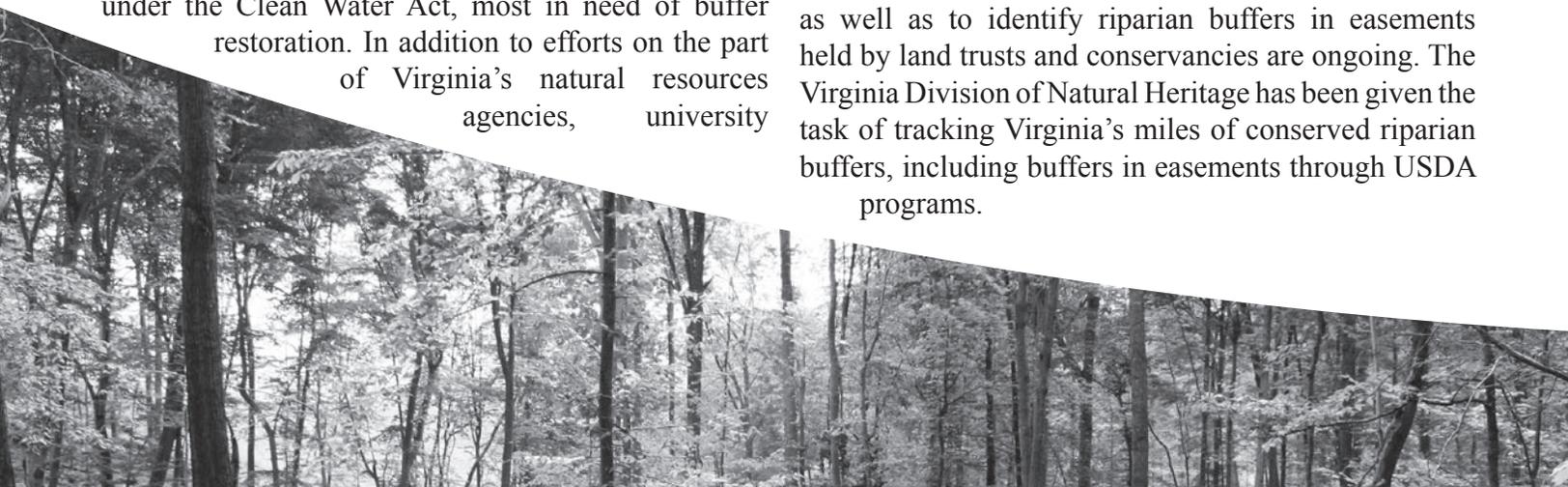
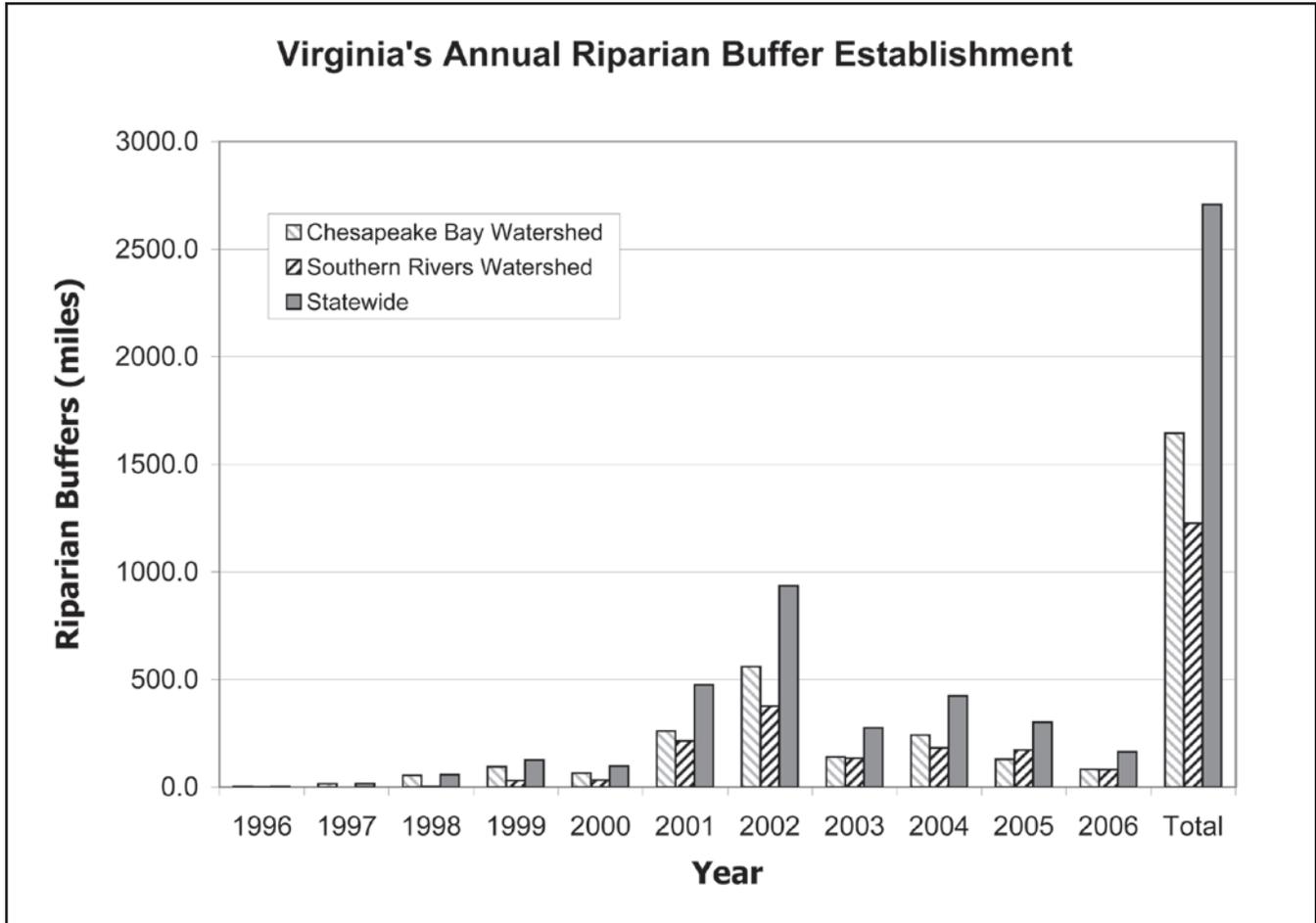


Figure 2



Watershed	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Chesapeake Bay Watershed	1.9	15.7	54.7	94.5	65.3	260.3	559.0	140.0	241.4	129.1	82.2	1,644.1
Southern Rivers Watershed	0.6	0.3	2.6	30.8	32.6	214.1	376.0	134.8	181.9	172.1	80.9	1,226.7
Statewide	2.5	16.0	57.3	125.3	97.9	474.4	935.0	274.8	423.3	301.2	163.1	2,707.7



Continued efforts in education and outreach are critical to the ongoing success of buffer restoration and conservation in Virginia. The state natural resources agencies continue efforts at outreach to volunteer groups and nonprofit organizations. A survey of such groups was completed in 1999, and several workshops have been conducted with information included on riparian buffers, CREP, and other cost-share programs. Efforts have also been made to include riparian buffer information in school curricula through the Department of Forestry's Project Learning Tree and other conservation education programs. The agencies have

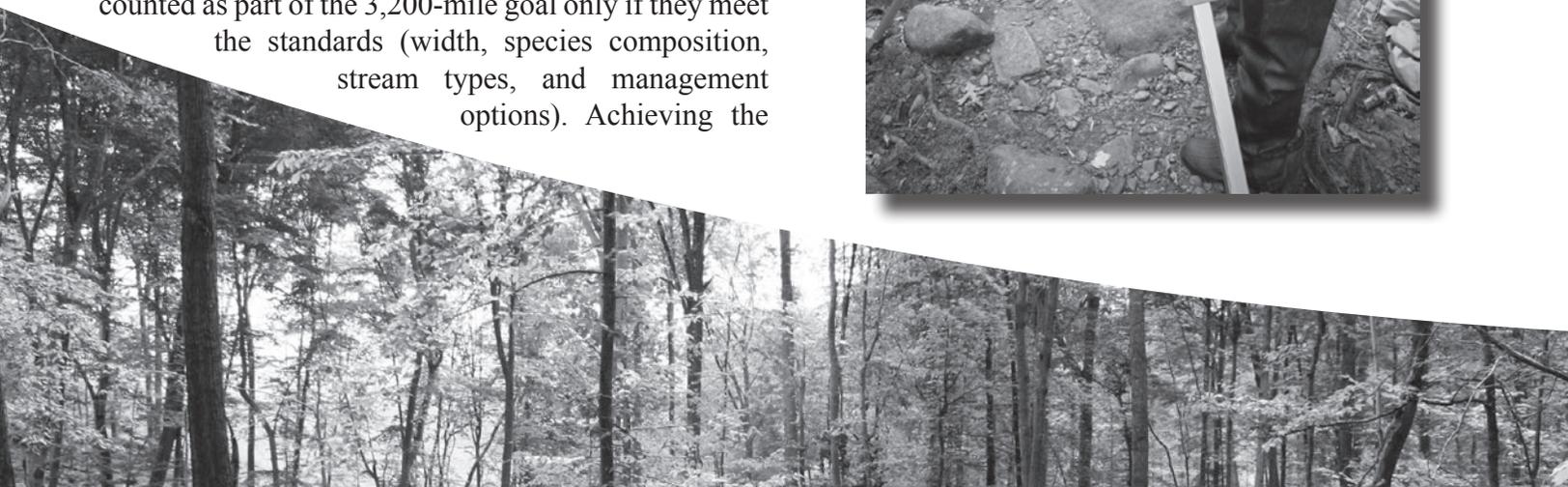
promoted activities by local watershed organizations. For example, working with the Potomac Conservancy to sponsor Growing Native, a seed-collection program that involved hundreds of volunteers and resulted in ten of thousands of pounds of tree seeds collected for use by the Department of Forestry nurseries. Demonstration sites have been and continue to be established with a goal of several in each major tributary basin. Other efforts include the distribution of buffer information to local real estate associations, homebuilders associations, and local Chambers of Commerce and cross-training among state and Federal agencies.

Overview

Virginia's Riparian Buffer Implementation Plan seeks to significantly increase the percentage of streams, rivers and other bodies of water that are protected by forested buffers. While there has been some early success, meeting the state's water quality goals will require a significant increase in restoration projects and better conservation of existing buffers. This program will be implemented statewide. The agencies of the Commonwealth will work with interested organizations, businesses and private landowners to establish, enhance and maintain various kinds of riparian buffers, as appropriate for the setting and use of the lands, recognizing that forested buffers are the ideal. The support and participation of private landowners is the key to the success of the plan, because the overwhelming majority of land adjacent to Virginia streams is in private ownership.

The Commonwealth's commitment to restore 3,200 miles of riparian forest buffers within Virginia's portion of the Chesapeake Bay watershed is a subset of this overall plan. However, riparian buffers will be counted as part of the 3,200-mile goal only if they meet the standards (width, species composition, stream types, and management options). Achieving the

Commonwealth's goals will be a vital contribution toward Virginia's commitment to protect all the waters of the Commonwealth.



Background On Riparian Buffers

What is a Riparian Buffer?

Although the definition of riparian areas and buffers may vary depending on the perspective of managers and scientists, various land use settings, and activities carried out in the riparian landscape, the following definitions are provided for the purposes of this plan:

- The word riparian comes from Latin meaning streambank or shore, and simply refers to land adjacent to a body of water, which serves as a transitional environment that directly affects or is affected by the presence of that water. In this context, a buffer is an area maintained in permanent vegetation and managed to reduce the impacts of adjacent land uses.
- A riparian forest buffer is a permanent area of trees, usually accompanied by shrubs and other vegetation that is adjacent to a body of water. It is managed to maintain the integrity of stream channels and shorelines, to reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals, and to supply food, cover, and thermal protection to fish and other wildlife. In many settings, grass filter strips may be installed upland of the forest buffer to improve its effectiveness. Riparian buffers are important to the health of living resources in and along streams.

Under natural conditions, riparian forests provide a dynamic, yet stable, buffering system along most shorelines, rivers, and streams in the Bay watershed. Most agree that riparian areas should not have fixed, linear boundaries but vary in width, shape and character. In their natural state, most are forested. And, of the various kinds of buffer vegetation, forest buffers offer the greatest range of environmental benefits.

Do Riparian Buffers Work?

Yes. Studies show that buffers are extremely effective in preventing pollutants from reaching streams. Reasonably sized, properly developed and managed riparian buffers are estimated to be effective at filtering 70 to almost 100 percent of nutrients and sediment from runoff. Without riparian buffers, water treatment plants become more necessary and expensive to operate. Riparian buffers moderate runoff and protect streambanks. Without riparian buffers, many streams become subject to erosion, widening and down cutting, which generates in-stream sediment pollution and threatens nearby buildings, roads, bridges and utilities.

Another way to measure riparian buffer effectiveness is to compare the cost of establishing and maintaining buffers versus repairing problems created where there are no buffers. These dilemmas are expensive to solve, often involving taxpayer money. Furthermore, experience has demonstrated that structural alternatives that prevent or repair stream channel and shoreline erosion damage need to be used in concert with riparian buffers to achieve full stream restoration potential.

What is the Scientific Viewpoint?

The phenomenon of riparian buffers is not new. They have been under study for 30 years, with knowledge of their values and functions growing rapidly. Yet, it was only recently that scientific research on water quality and ecological functions were applied to managing land use.

Scientists agree on the critical habitat functions and research continues to advance



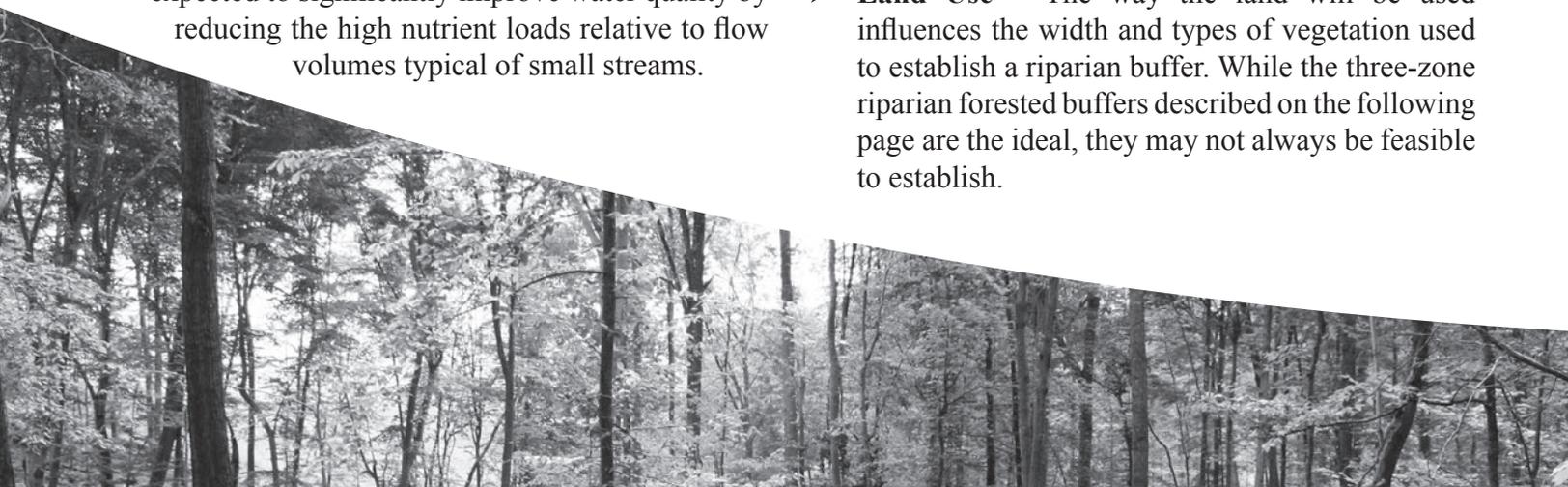
technical information about water quality functions of riparian buffers. Although few studies have documented specific water quality changes during a riparian buffer restoration, newly planted buffers are expected to sustain water quality functions as time goes on similar to a natural system.

In 1995, the Chesapeake Bay Program released a research report, *Water Quality Functions of Riparian Forest Buffer Systems in the Chesapeake Bay Watershed*, by Dr. Richard Lowrance, et al. The report firmly supports riparian forest buffers as a pollution prevention tool; describes and quantifies ecological and water quality functions, and discusses the predicted effectiveness levels. A non-technical “White Paper” summary is available from the Alliance for the Chesapeake Bay.

What Are Buffer Establishment Considerations?

Here are some issues to consider when establishing priorities for riparian buffer use:

- **Habitat** – Riparian forests are essential for fish and wildlife, especially for migratory birds, providing a place to rest and feed on long journeys. Targeting for habitat enhancement is different than for water quality.
- **Stream Size** – More than 70 percent of Virginia’s stream miles are comprised of small streams (orders 1-3) and may be priority areas to reduce nutrients. Establishing riparian buffers along small streams is expected to significantly improve water quality by reducing the high nutrient loads relative to flow volumes typical of small streams.
- **Continuous Buffers** – Establishing continuous riparian forest buffers in the landscape should be given a higher priority than establishing larger but fragmented buffers. Continuous buffers provide better stream shading and water quality protection, as well as corridors for the movement of wildlife.
- **Geography** – Water quality benefits of riparian forest buffers may be highest in the Mountain, Valley and Ridge provinces followed by the Piedmont and Coastal Plain areas.
- **Degree of Degradation** – This is directly related to the benefits expected from riparian buffers. Streams in areas without forests, such as pasture, may benefit the most, while highly urbanized/ altered streams may not be able to provide high levels of pollution control.
- **Loading Rates** – The removal of pollutants may be highest where nutrients and sediment loadings are the highest.
- **Land Use** – The way the land will be used influences the width and types of vegetation used to establish a riparian buffer. While the three-zone riparian forested buffers described on the following page are the ideal, they may not always be feasible to establish.



What Are The Benefits?

- **Filtering Runoff** – Rain and sediment that runs off land can be slowed and filtered in the forest, settling out sediment, nutrients and pesticides before they reach streams. It is common for forest buffers to achieve infiltration rates 10-15 times higher than grass turf and 40 times higher than a plowed field.
- **Nutrient Uptake** – The roots of vegetation absorb fertilizers and other pollutants originating on land. Nutrients are stored in leaves, limbs and roots instead of reaching the stream. Through a process called “denitrification,” forest floor bacteria convert harmful nitrate to nitrogen gas, which is released into the air.
- **Canopy and Shade** – The forest leaf canopy provides shade to keep the water cool, which helps in retaining more dissolved oxygen and encourages the growth of diatoms, beneficial algae and aquatic insects. Also the canopy improves air quality by filtering dust from wind erosion, construction, or farm machinery.
- **Leaf Food Base**– Tree leaves fall into a stream and are trapped on woody debris and rocks, where they provide food and habitat for small, bottom-dwelling creatures (such as insects, amphibians, crustaceans, and small fish) which are critical to the aquatic food chain.
- **Fish/Wildlife Habitat** – Riparian forest buffers provide the most diverse habitats for fish and other wildlife. Woody debris provides cover for fish while preserving stream habitat over time. Forest diversity is valuable for birds and other wildlife.
- **Flood Protection** – Riparian forest buffers tend to diminish the force of flood waters, often reducing negative impacts.

Key Programmatic Elements

Riparian Buffers and Virginia’s Tributary Strategies

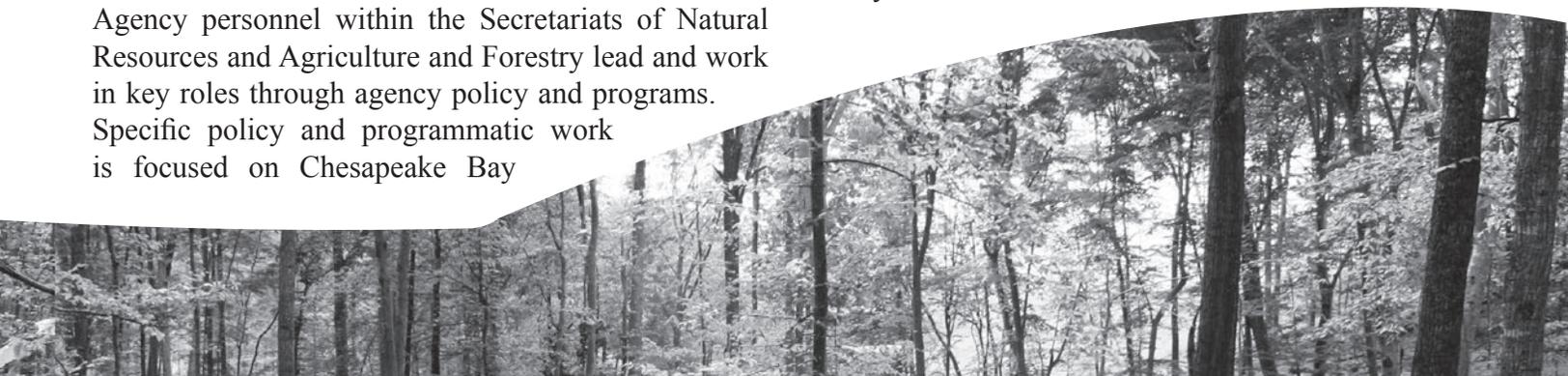
Virginia remains constantly focused and committed to restoration of the Chesapeake Bay and its tributaries. The Virginia General Assembly and multiple governors have proven through leadership and dedication to the Commonwealth’s citizenry that we will continue to explore and address every possible means of natural resource conservation.

At our state level, scientists, administrators, politicians, corporate leaders, researchers and volunteers work together on a daily basis sharing areas of expertise and jurisdiction.

Agency personnel within the Secretariats of Natural Resources and Agriculture and Forestry lead and work in key roles through agency policy and programs. Specific policy and programmatic work is focused on Chesapeake Bay

restoration, while overall programs and policy are applied to water-quality improvement needs statewide.

The multi-jurisdictional Chesapeake Bay Program was formed in 1983 following the scientific determination that the deteriorating health of the Bay needed to be restored and protected. In 1987, the partners renewed their agreement and further set a goal to reduce the amount of nitrogen and phosphorus entering the Bay by 40 percent of the amount estimated in 1985, and to do this by 2000. Each partner agreed to develop tributary-specific strategies for accomplishment. While pollution reduction measures were continuously implemented, it soon became evident that much more precision would be necessary to adequately restore the health of the estuary.



The *Chesapeake 2000*, or C2K agreement, was adopted by the partnership with additional partners of the headwater states – West Virginia, New York and Delaware – signing on to guide, strengthen and identify main areas of focus for successful pollution reduction measures. Objectives of the new agreement are outlined by categories listing more than 100 goals. Living Resource Protection and Restoration; Vital Habitat Protection and Restoration; Water Quality; Sound Land Use, and Stewardship and Community Education are the five major categories. In Virginia, each of the goals within these categories is tracked and reported on annually by the Virginia Secretariat of Natural Resources to the Virginia General Assembly and posted on the Internet for wide availability.

The most targeted product to date for Chesapeake Bay restoration and watershed management is the Virginia Tributary Strategy planning series. *The Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy*, January 2005, recognizes Virginia's 20 years of accomplishments and summarizes actions needed to achieve ambitious nutrient and sediment reduction goals set out in the *Chesapeake 2000 Agreement*. Current and future actions, processes and associated projected costs are summarized in this document for all of Virginia's five major Chesapeake Bay river basins. Detailed "Strategy documents" were developed involving local stakeholders for their respective watershed in: the Shenandoah- Potomac, Rappahannock, York, James and Bay Coastal watersheds. It is through this extensive planning process that we now have far-reaching goals and actions outlined to address them. New tools are continuously developing and established policies and programs are being strengthened.

The strategies provide a plan for implementation and a cost estimate associated with that implementation.

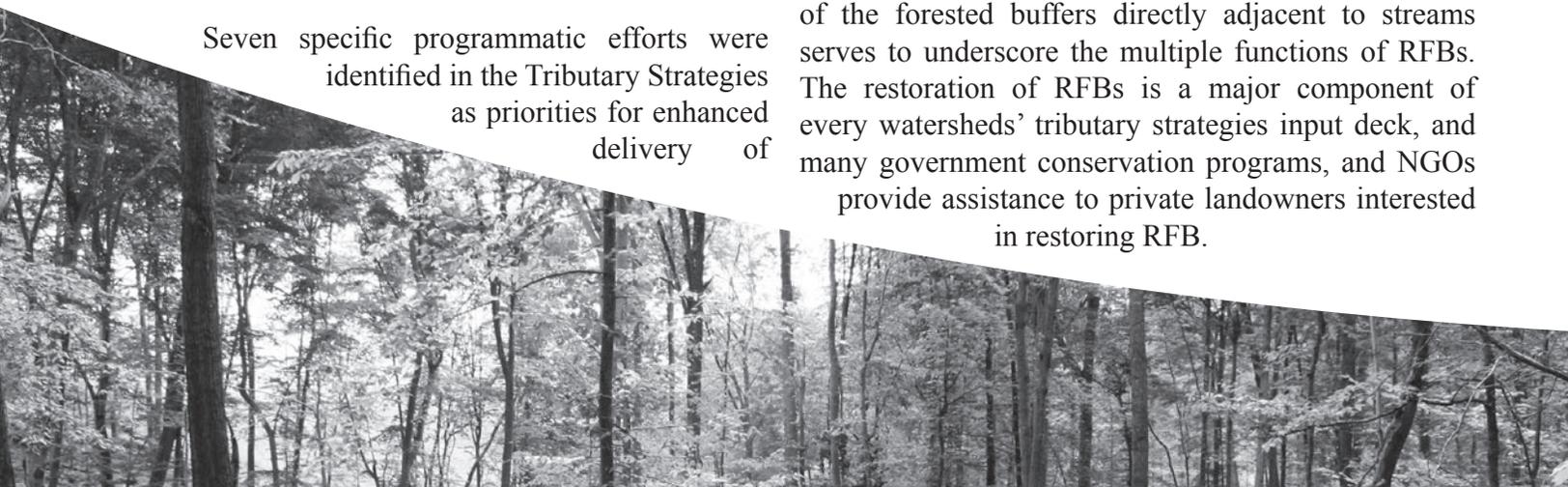
Seven specific programmatic efforts were identified in the Tributary Strategies as priorities for enhanced delivery of

existing programs, these include:

1. Agricultural Best Management Practices (BMP) Acceleration, including riparian forest buffers
2. Expansion of the Nutrient Management Planning and Implementation Efforts
3. The consolidation and strengthening of the Virginia Storm Water Management Program
4. Enhanced Implementation of the Virginia Erosion and Sediment Control Program
5. Strengthened Implementation of the Chesapeake Bay Preservation Act
6. Enhancement of the NPS Implementation Database Tracking Systems
7. Improved outreach, media, and education efforts to reduce pollution-producing behaviors.

The tributary strategies process utilized input from local jurisdictions, Soil and Water Conservation Districts, watershed roundtables and non-governmental organizations (NGO) to identify and quantify BMP implementation required to meet Virginia's water quality standards and to de-list the Chesapeake Bay. These input decks were processed through the Chesapeake Bay watershed model and Water Quality model then readjusted until the model confirmed that the standards would be met. These Tributary Strategies input decks now can provide a roadmap to BMP implementation on all land uses within the Commonwealth. The Tributary Strategies identify 362,716 acres of RFB still in need of restoration or roughly 30,000 miles of 100-foot wide buffer still in need of restoration.

Riparian Forest Buffers are important BMPs for reduction of non-point source loads, and are effective in both urban and agricultural landscapes. The placement of the forested buffers directly adjacent to streams serves to underscore the multiple functions of RFBs. The restoration of RFBs is a major component of every watershed's tributary strategies input deck, and many government conservation programs, and NGOs provide assistance to private landowners interested in restoring RFB.



Riparian Buffers and TMDLs

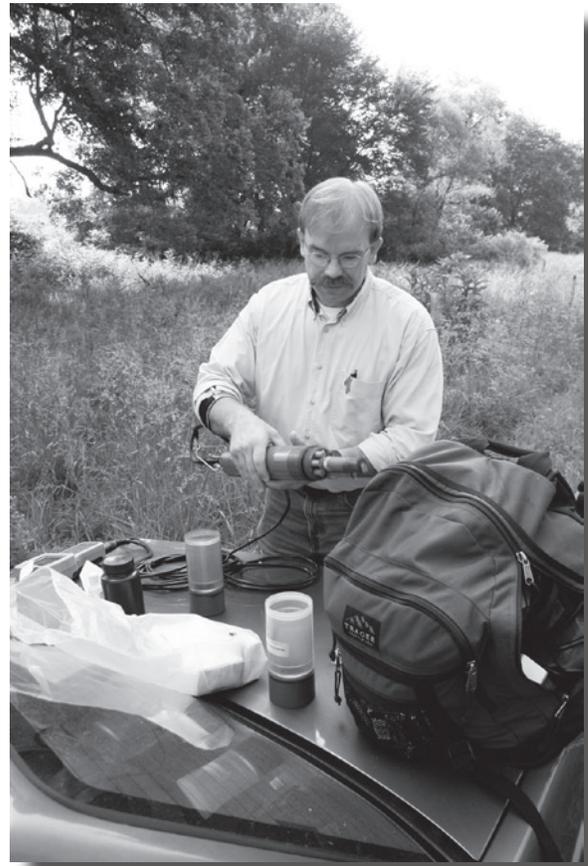
The goal of Virginia's Total Maximum Daily Load (TMDL) program is to restore and maintain water quality targets in Virginia's rivers, lakes and estuaries. Meeting Virginia's water quality goals will require high levels of all available pollutant control strategies, including riparian buffers. Riparian buffers, as described in previous chapters, result in a multitude of benefits that directly result in improved water quality conditions, for example for sediment, nutrients, bacteria and aquatic life. The following paragraphs provide some background on the TMDL program and highlight opportunities for linkages between that program and Virginia's riparian buffer initiative.

The Virginia Department of Environmental Quality monitors the state's rivers, lakes and tidal waters for pollutants every year to determine if the public can use them for swimming, fishing and drinking (Clean Water Act, 1970). If pollution amounts are too high, the waters cannot support their designated uses and fail to meet Virginia water quality standards. These waters are considered "impaired."

Since 1999, DEQ has developed plans, with public input, to restore and maintain the water quality of the impaired waters. These plans establish a "total maximum daily load," or TMDL, for the impaired waters. A TMDL represents the total amount of a pollutant a water body can contain and still meet water quality standards. Virginia also develops TMDL implementation plans and works with partners at the local, state and Federal level to reduce pollution to the level required by the TMDLs.

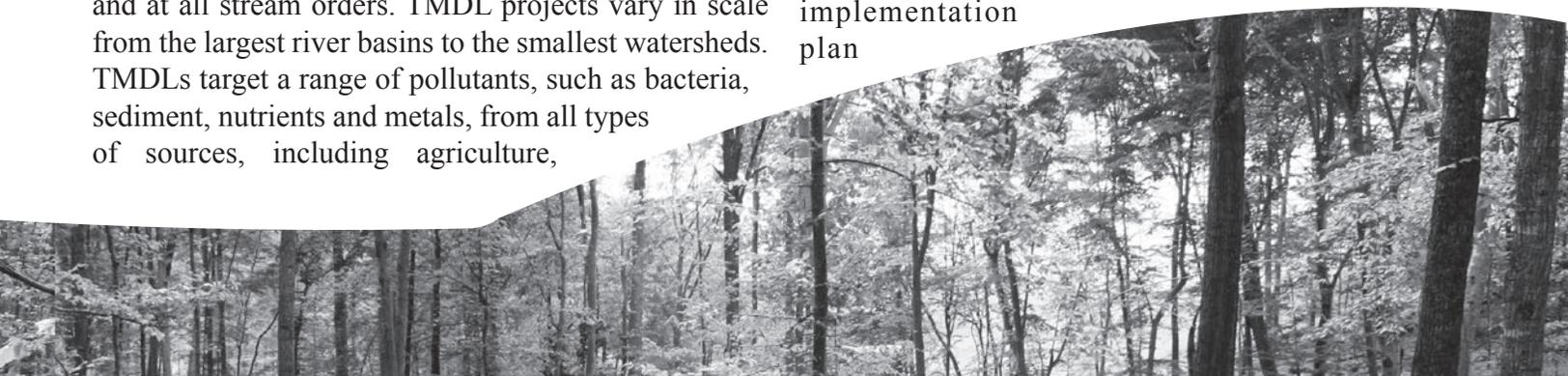
Implementation Plans

TMDLs address impairments in all areas of the state and at all stream orders. TMDL projects vary in scale from the largest river basins to the smallest watersheds. TMDLs target a range of pollutants, such as bacteria, sediment, nutrients and metals, from all types of sources, including agriculture,



urban, rural residential and mining. DEQ's TMDL Web page includes information on all completed and pending TMDL projects as well as additional program information. (see <http://www.deq.state.va.us/tmdl/>)

Once a TMDL is developed and approved by the Environmental Protection Agency (EPA), measures must be taken to reduce pollution levels in the stream. These measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), are implemented in a staged process that is described along with specific BMPs in the TMDL implementation plan (IP). An implementation plan



can be developed by Virginia agencies such as DEQ, DCR or DMME, or by stakeholders. The plan describes ways to reduce pollution levels in the stream, and includes a schedule of actions, costs and monitoring. Through May 2006, the TMDL program to date has completed 13 implementation plans, of which 11 are being actively state-funded. An additional 10 plans are under development, with several more to be initiated over the next year.

The program and its partners work to achieve a TMDL by reducing pollution according to the best management practices established in the implementation plan. Best management practices are effective and practical ways to prevent or reduce pollution from both permitted and non-permitted nonpoint sources to ensure water quality. They could range from repairing septic systems and establishing storage areas for animal waste to planting vegetation along stream sides.

Riparian Buffer Zones are among the priority implementation actions identified by local stakeholders in several implementation plans, addressing sediment and bacteria TMDLs in both urban and rural areas. For example, riparian buffers are specifically quantified in the Stroubles Creek TMDL IP in Montgomery County; in the IP for the Abrams and Opequon Creeks TMDLs in Frederick County, and in the Guest River TMDL IP in Wise County. IPs typically quantify the extent of riparian buffer needed, the estimated cost, and in some cases even suggest specific locations for riparian buffers. Thus, TMDL IPs provide excellent opportunities to target riparian buffer initiative resources, resulting not only in progress toward regional goals, such as the Chesapeake Bay restoration, but toward local water quality improvements as well.

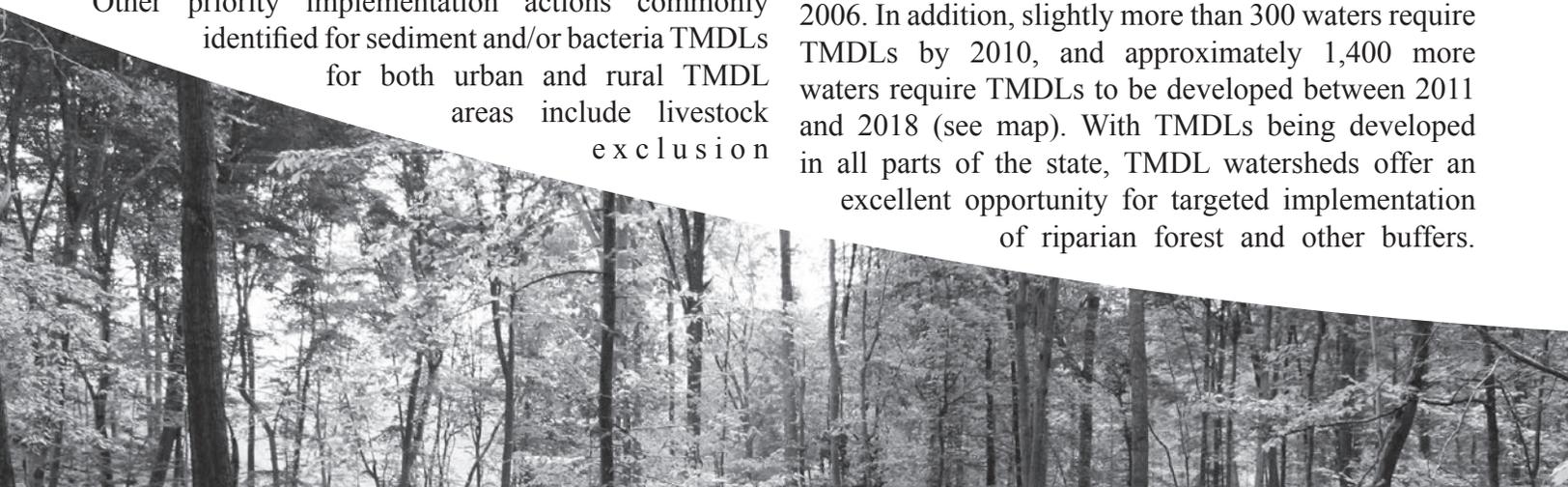
Other priority implementation actions commonly identified for sediment and/or bacteria TMDLs for both urban and rural TMDL areas include livestock exclusion

from stream access, streambank erosion and stream channel modifications, all of which can be achieved wholly or at least in part with riparian buffers. Virginia's implementation plan guidance manual shows riparian buffers as a BMP that is applicable in urban, mining and rural TMDL areas and calls for a priority focus on near-stream areas, which highlights the importance that riparian buffer installation has in TMDL watersheds.



The TMDL program is committed to extensive public outreach efforts, which presents an opportunity to publicize the riparian buffer initiative effort and can result in mutually beneficial results. Local stakeholders in the TMDL process are made aware of available resources and opportunities for BMP implementation. By emphasizing and publicizing the riparian buffer initiative at TMDL and TMDL IP meetings, the Commonwealth may gain many more participants in this initiative.

To date, the Virginia TMDL program has successfully met the demands of a rigorous development schedule. The program completed 381 TMDLs from 1999 to May 2006. In addition, slightly more than 300 waters require TMDLs by 2010, and approximately 1,400 more waters require TMDLs to be developed between 2011 and 2018 (see map). With TMDLs being developed in all parts of the state, TMDL watersheds offer an excellent opportunity for targeted implementation of riparian forest and other buffers.



Riparian buffers in TMDL watersheds would support local water quality improvements that may be demonstrated sooner than regional water quality goals. Having more readily observable local effects would serve as an incentive to local stakeholders living in the watershed who ultimately must implement and/or financially support the buffers. And lastly, TMDL watersheds typically receive funding from a variety of sources to support the TMDL implementation efforts, thus creating synergies within the implementation effort.

DEQ's TMDL program is committed to encouraging the use of riparian forest and other buffers to achieve

Virginia's water quality goals. TMDLs offer an opportunity for conservation efforts such as the riparian buffer initiative, to target their practices, and achieve environmental results by linking with other conservation and restoration efforts. DEQ will work with interested agencies and stakeholders to target outreach efforts and funding in areas with TMDL implementation plans, completed TMDLs or waters impaired for bacteria or with benthic aquatic life use problems. DEQ staff will use its public participation opportunities to promote the various programs to establish, protect, and maintain buffers and assist with the cooperative Virginia effort to meet the Commonwealth's Forested Riparian Buffer goals.

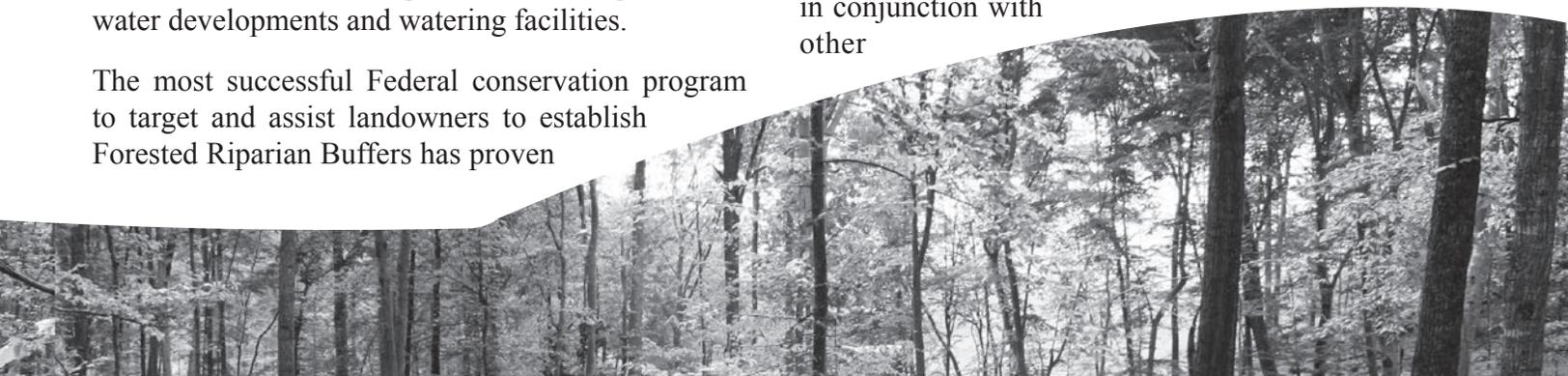
Federal Perspective/Farm Bill Implementations

The USDA administers a number of conservation programs authorized by recent Farm Bills and other enabling legislation. USDA conservation programs are intended to foster and promote resource conservation on farms in agricultural settings. In urban areas, Federal involvement is usually limited to technical assistance only. Many of the Farm Bill programs provide cost sharing and/or incentives to landowners for the installation of conservation practices that result in improved management of the natural resources. These resources include soil, water, air, plants and animals. Forested riparian and other buffer establishment is one practice that may address many of these concerns and, therefore, is an important component of the USDA conservation programs in Virginia. However, in Virginia's agricultural landscape, additional practices are generally necessary to establish a functioning Forested Riparian Buffer. These practices include, but are not limited to, fencing, stream crossings, livestock water developments and watering facilities.

The most successful Federal conservation program to target and assist landowners to establish Forested Riparian Buffers has proven

to be the Conservation Reserve Enhancement Program (CREP). This program is administered by the Farm Service Agency (FSA) with technical responsibility provided by NRCS, the Virginia Department of Forestry and SWCDs. This program is the result of a cooperative effort between the state and Federal government to target specific practices (Filter Strip, Forested Riparian Buffer, and Wetland Restoration) within the Chesapeake Bay and Southern Rivers Watersheds. Eligible lands include marginal pasture land and cropland adjacent to intermittent or perennial water bodies including streams, lakes, ponds, wetlands, sinkholes and karst areas. Hardwood trees are the main component on all forested riparian buffers entered into CREP.

The Environmental Quality Incentives Program (EQIP) and Wildlife Habitat Incentives Program (WHIP) are programs administered by NRCS which also provide for the installation and protection of buffers usually in conjunction with other



practices and other resource concerns, such as improved grazing management and wildlife corridor establishment.

In addition to traditional cost share incentive programs, the NRCS administers three easement programs: the Farm and Ranchland Protection Program (FRPP), the Wetland Reserve Program (WRP) and the Grassland Reserve Program (GRP). Lands entered into these programs are placed into permanent easements. Each program has unique easement provisions with all easements being held by USDA or a qualified partner. Lands placed into easements are required to have a conservation plan prepared to a level of treatment (Resource Management System) that promotes sustainability for all resources. Buffers are a practice that has been included on every farm accepted in these programs.

The 2002 Farm Bill provides for record-level funding for USDA farm conservation programs. Currently, the 2007-2012 Farm Bill is being developed. The funding levels are uncertain at this time. Federal agencies are committed to providing conservation planning assistance that promotes the wise use, maintenance and improvement of natural resources. Forested Riparian Buffers are a natural fit into the NRCS conservation planning process. NRCS works closely with Virginia Department of Forestry (VVDFOF), Department of Conservation and Recreation (DCR), Farm Service Agency (FSA) and others to promote the establishment of Forested Riparian Buffers. FSA and NRCS will continue to encourage landowners to utilize the various USDA Farm Bill programs to establish, protect, and maintain buffers and assist with the cooperative Virginia effort to meet the Chesapeake Bay Forested Riparian Buffer goals.

Role of Non-Government Organizations (NGO) In Buffer Success

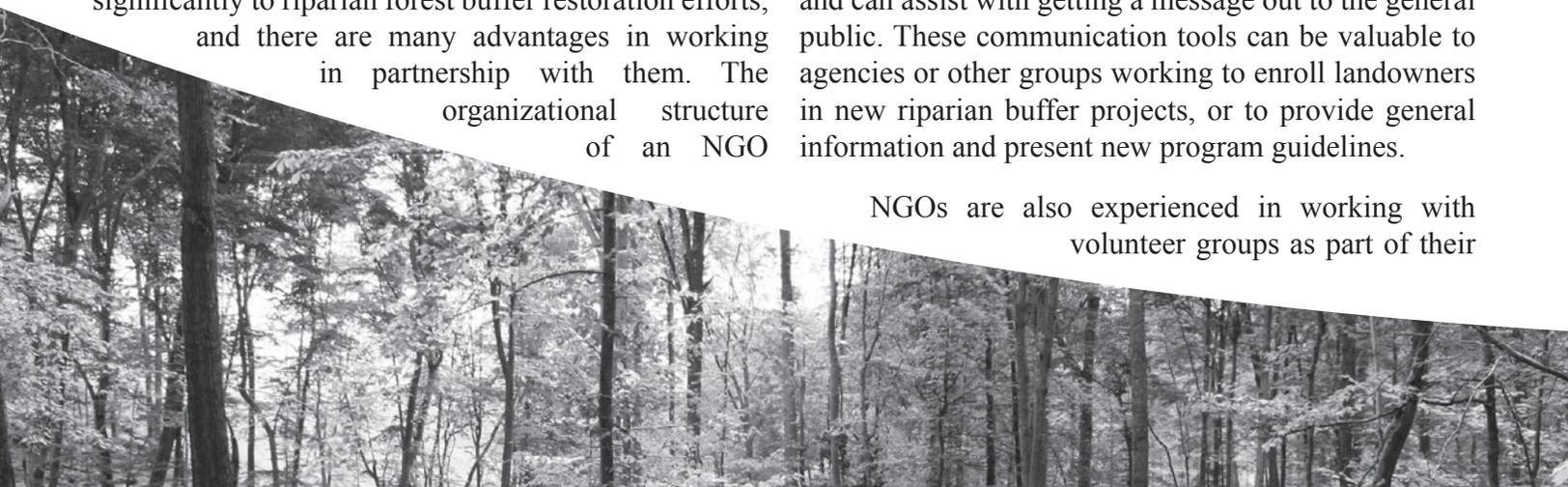
The Chesapeake Bay Foundation and other non-governmental organizations (NGOs) focused on water quality have a great interest in riparian buffers. The damage or removal of these natural filters within our ecosystem has resulted in an increase of nutrient pollution reaching our waterways. We now must work together to restore and replace these important natural filters as part of the solution to reduce nutrient loads within our watersheds.

Non-governmental organizations (NGOs) contribute significantly to riparian forest buffer restoration efforts, and there are many advantages in working in partnership with them. The organizational structure of an NGO

can often provide opportunities for adding expertise, funding, and staff to existing projects; working one-on-one with new landowners; organizing and educating volunteers, and investigating new technologies.

Many NGOs have an active member base that already cares deeply about the natural resource conditions. An organization may already have an established way to communicate with its members and provide important educational information regarding riparian buffers. NGOs often have staff skilled in outreach and education, and can assist with getting a message out to the general public. These communication tools can be valuable to agencies or other groups working to enroll landowners in new riparian buffer projects, or to provide general information and present new program guidelines.

NGOs are also experienced in working with volunteer groups as part of their



outreach activities. Having volunteers plant a riparian restoration site (or portion of a project) can provide many benefits. One of the primary benefits includes providing an opportunity for volunteers to get involved in the solution, right in their local community, rather than just reading about it in a newsletter or on a Web site. Also, during a volunteer planting event, the public has an opportunity to learn more about how riparian buffers work and why buffers are so important to water quality, which can reap real benefits when volunteers return home and share that information with other people.

In Virginia, the Chesapeake Bay Foundation offers several opportunities for the public to get involved on a restoration site by planting hardwood tree seedlings. The planting “events” are generally held Saturday mornings and begin with a welcome and brief overview of the project site. CBF staff then instructs volunteers on how to plant the tree seedlings and continues to work along with the volunteers, not only to ensure trees are planted correctly but also to talk about the importance of buffers and how they help to improve water quality. Each volunteer event requires a fair amount of planning time, and the event itself only lasts for a short period of time. The benefits, however, can be long-lasting, not only for the forested riparian buffer that results but also for the volunteers, who then help to spread the message.

More Buffer Projects

NGOs can provide additional avenues to reach landowners regarding forested riparian buffer projects. Depending on the expertise of the NGO staff, they can sometimes provide technical assistance to landowners, program information and assist in linking potential project sites with available funding sources. NGOs have a unique capacity to work with a cross-section of individuals including landowners, public agencies, and other NGOs. Some landowners also prefer to work with organizations not associated with state or Federal government agencies. For these landowners, NGO staff can provide an important service and link to getting a project installed that might otherwise have been missed.

Through grants and other private funding sources, NGOs can sometimes provide funding for a special project or one that may not qualify for existing programs, such as the Conservation Reserve Enhancement Program (CREP) or Virginia State Best Management Practices

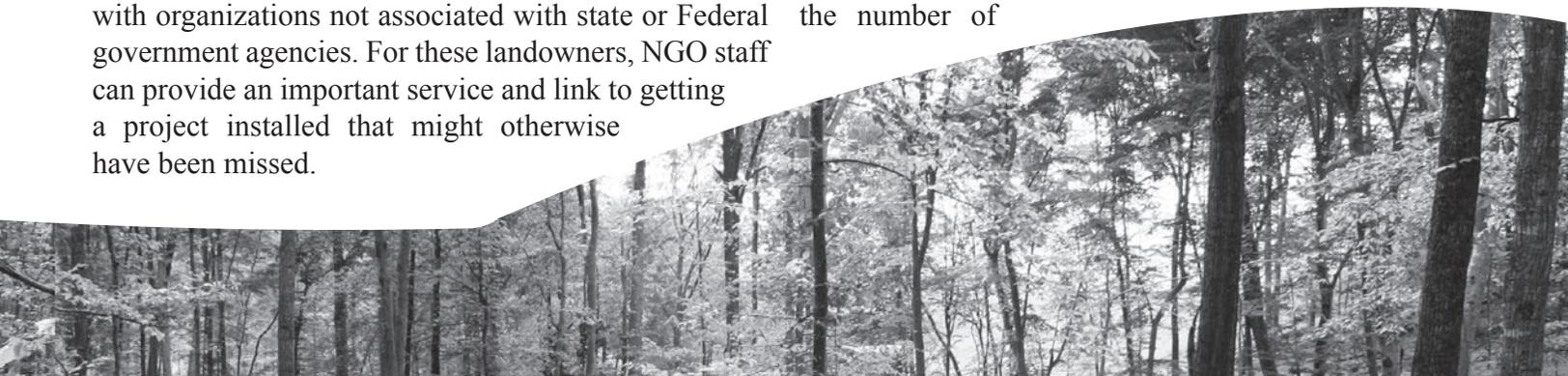


Program (BMP). Another advantage might include increased program flexibility for the landowners and partners through alternative cost-share programs and funding sources often associated with NGOs.

New Technologies

Grant funding can also allow NGOs to experiment with developing new technologies, methods, or research to enhance and improve current riparian buffer practices. One example of this is the “Acorns to Acres” pilot project coordinated by the Chesapeake Bay Foundation and funded through a National Fish and Wildlife Foundation Chesapeake Bay Small Watershed Grant.

The project included working with several partners to retrofit a used no-till corn planter so that it could be used by farmers and landowners to plant acorns. The idea was that if farmers could use equipment they were already familiar with to increase the number of



hardwood trees along streams and rivers, and if this method of direct seeding provided good results and was cost efficient, more landowners may chose to plant forested riparian buffers on their farmland.

A used John Deere Maxi-Emerge corn planter was located and retrofitted in 2004 to plant four different sizes of acorns – white oak, red oak, willow oak and black oak. During the first year of the pilot project, a 10-acre field along the Rappahannock River in Virginia was planted. Although monitoring of the site and seedlings continues, initial results are positive and the seedlings are growing well. Around the same time the acorns were planted, 2-year-old oak seedlings were also planted through traditional methods in the field adjacent to the project site, and will be used for comparison as the pilot project is evaluated in the future.

Advocacy

Finally, developing a strong partnership with NGOs can also help to serve as an important advocacy tool when working on related local, state and Federal issues. In many cases, the NGO is subject to a flexible set of guidelines when it comes to lobbying on legislative issues, spending funds, and working with volunteers. Coordinating and maintaining good working networks with NGOs can help to advance everyone’s common mission and goals, which can result in more acres and miles of riparian forest buffers being restored in the Chesapeake Bay watershed.



Urban and Community Forestry and Its Role In Buffer Success

The urban forest is comprised of all the trees in the community. It is the trees that grow individually, in small groups, or under forest conditions on public, private and commercial properties in our cities, their suburbs, and towns. This includes an estimated 74.4 billion trees across the U.S. that surround us everyday in parks, along streets, and around private homes and businesses in urban areas. Urban tree canopy (UTC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

While we may not think of trees in cities as a typical “forest,” these trees provide valued services to our daily lives. These benefits include: reducing the urban heat island effect, saving energy, lowering city temperatures, reducing air pollution, enhancing property values, providing wildlife habitat, facilitating social and educational opportunities, and providing aesthetic benefits. UTC captures sediments and pesticides in runoff as well as large amounts of nitrogen and phosphorus. Scientists now have the ability to qualify and quantify the benefits of UTC. An increase in UTC brings an associated increase in the UTC benefits listed above and serves as a surrogate for riparian forest buffers in the urban environment.

As urban development continues to expand over the landscape, the relation among urban growth, urban influence, and natural resources systems will become increasingly important. As urbanization spreads into less developed areas, a growing percentage of our natural resources will become part of urban forest ecosystems and an increasing amount of forest outside these systems will be subject to urban influence. As such, it is important that communities take steps to protect and enhance their urban forests in the areas that are already developed as well as those that are in a more natural form of land cover through a UTC goal-setting process. While many communities have adopted land-use strategies (Green Infrastructure, Smart Growth, etc.) to mitigate

sprawl and urbanization, few have developed land-cover strategies, such as UTC, to mitigate urbanization effects regardless of land use type. It is preferable to institutionalize the goal in some type of ordinance or master plan for the community.

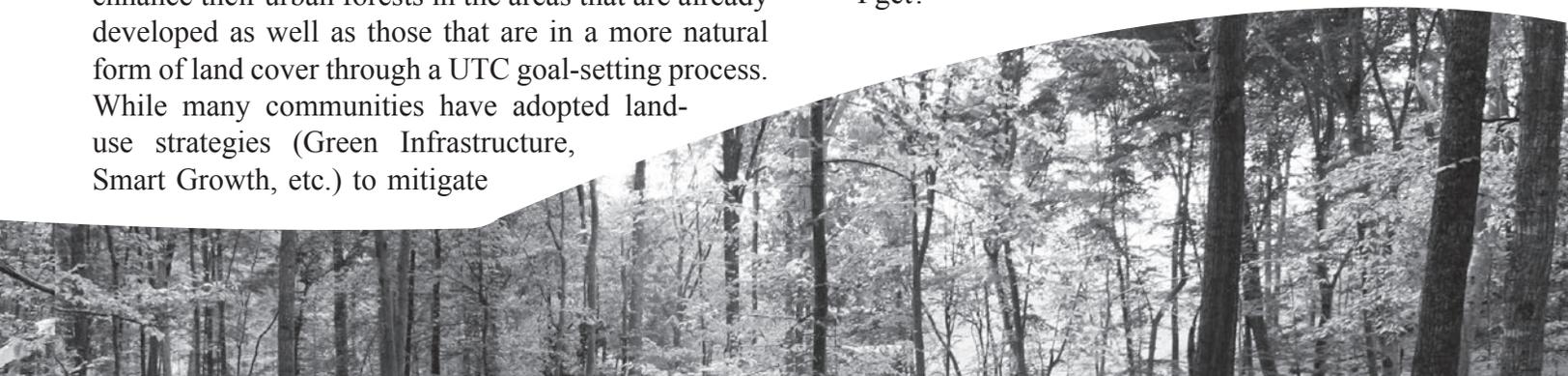
Some specific examples of UTC planning in addressing community and human health concerns include:

- Inclusion of UTC increase in state plans to improve air quality by mitigating ground-level ozone formation (<http://www.treescleanair.org>);
- Inclusion of UTC increase in strategies to improve quality of life for urban dwellers by reducing carbon dioxide emissions, mitigating the heat island effect, reducing energy consumption, and contributing to efforts to reduce global warming trends (http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+16 USC2105)

Here are some steps to consider when establishing priorities for UTC:

Steps in UTC goal setting include the following:

- Assessment of present condition; how much UTC do I have?
 - Identification of various types of forestry opportunities (FOS) in the community (public opportunities [street trees, parks, etc.], private opportunities [residential, commercial, and industrial sites], and of existing UTC by FOS type.
- Assessment of potential UTC; how much UTC can I get?



- Assessment by potential UTC by FOS type.
 - ◆ Assessment of possible, probable, and preferable UTC by FOS type.
- Adoption of the UTC goal based on the findings of the assessments.
- Goal setting includes:
 - Current UTC;
 - New tree planting to increase UTC;
 - Protection and maintenance of existing trees to realize related UTC growth, and
 - Loss from tree mortality and land conversion.

The assessments required for UTC goal setting are normally performed using Geographic Information Systems (GIS). GIS tools developed to assist communities with UTC Goal setting, along with supporting information and documentation, are available @: <http://www.UNRI.org/FOS>. UTC goal setting can be undertaken for a number of worthwhile purposes (air quality, water quality, etc.). The noted tools can facilitate the goal processes regardless of the premise. The cities of Annapolis and Baltimore have already begun to use these tools to set UTC goals. In Virginia, Arlington County and the Town of Leesburg have initiated the process to develop UTC goals for their communities.



Implementation Plan

In October 1996, former Gov. George Allen committed Virginia to plant 610 miles of riparian forest buffers by 2010 – an average of more than 43 miles annually. After achieving that goal early, Gov. Warner increased that commitment to 3,200 miles, requiring 354 miles annually over five years to meet the 2010 goal. The six objectives outlined in this plan are based on the Chesapeake Executive Council’s goals and policies. The following is a description of each objective, key background information, and specific strategies.

Objective 1 – Restore Missing or Inadequate Riparian Buffers

Restore riparian forests on at least 3,200 miles of stream and shoreline in the watershed by 2010, targeting efforts where they will be of greatest value to water quality and living resources.

This objective identifies programs, strategies, and other efforts to establish riparian buffers in needed areas. The most common methods are planting and natural regeneration, letting shrubs and trees seed an area naturally and grow. Recognizing that forested buffers may not be appropriate for every setting, this initiative will promote planting and restoration of all riparian buffer types. Virginia will track restored riparian buffers.

The 3,200-mile goal outlined in the Chesapeake Agreement applies only to those parts of the state that drain into the Chesapeake Bay. In order for buffers to be counted towards the Bay goal, they must be a minimum of 35 feet in width. In addition to the short-term goal, the state’s natural resource experts aspire to an even greater number of buffer miles. The 2005 Chesapeake Bay Nutrient and Sediment Reduction Strategy emphasizes the importance of riparian buffers in their effectiveness in controlling non-point source pollutant loadings. The

tributary – specific strategies stipulate a long-term goal on the order of 70 percent of our streams be buffered on both sides, which means an additional 362,716 acres of restoration, or the equivalent of 30,000 miles of buffers, 100 feet wide on both sides

Strategies

1-1. Identify Restoration Sites

Develop inventories of the current status of land uses adjacent to streams and target areas for restoration utilizing aerial photography and Geographic Information System (GIS) mapping.

The Department of Forestry is conducting an intensive remote sensing survey of the riparian areas on all the streams in the lower Rappahannock River watershed (Fredericksburg and downstream). By identifying the areas that are lacking adequate buffers, there is an opportunity to more effectively target specific properties and landowners and match any available funding to promote additional buffer miles.

The Planning District Commissions in the area are providing information showing property ownership through digitized tax maps that can be loaded into the GIS system. DCR – through its network of Watershed field offices—in cooperation with SWCD, VDOF, Cooperative Extension and NRCS staff—is prepared to directly contact individual landowners once they have been identified.

This process is intended to serve as a pilot that will be replicated on other watersheds. The county of Albemarle is initiating its own remote sensing inventory of riparian areas in cooperation with the VDOF. The county intends to promote riparian forest buffers on lands surrounding streams

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on the impaired waters (303d) list. Farther to the north, the upper Rappahannock has been studied to a great extent by citizens groups and there is a growing set of valuable data available describing the condition of this watershed. This information will be linked to broader state mapping efforts. As the state (Virginia Basemap) photography is regularly updated, this remote sensing procedure can be updated to allow analysis of the trends in land use in riparian areas.

1-2. Implement Buffer Plantings in Impaired Watersheds

Many Virginia stream miles are listed on the 303d list of impaired waters (as shown in Figure 4), that is, they are not meeting designated uses, such as for recreation and drinking. The U.S. Environmental Protection Agency requires Total Maximum Daily Load (TMDL) studies to determine the pollutant loadings a water body can assimilate and still meet quality standards. Implementation plans that follow aim to ensure that loadings do not exceed standards, and thus remove the stream segment from the listing. These plans rely heavily on Best Management Practices (BMPs) to address the nonpoint pollution loads. Riparian buffers are typically recognized as one of the best practices suited to control nutrient or sediment contributions from overland runoff. The improvements in water quality in these targeted stream segments will be thoroughly documented which will reinforce our understanding of the importance of buffers.

1-3. Ensure Nutrient Trading Efforts Include RFB Plantings

There is increasing discussion regarding Nutrient Trading and steps are underway to implement a program statewide. Participants who are able to implement exceptional water protection practices can trade credits to others who are contributing nutrients to the state's waters. The details of how a point source, such as a sewage treatment facility,

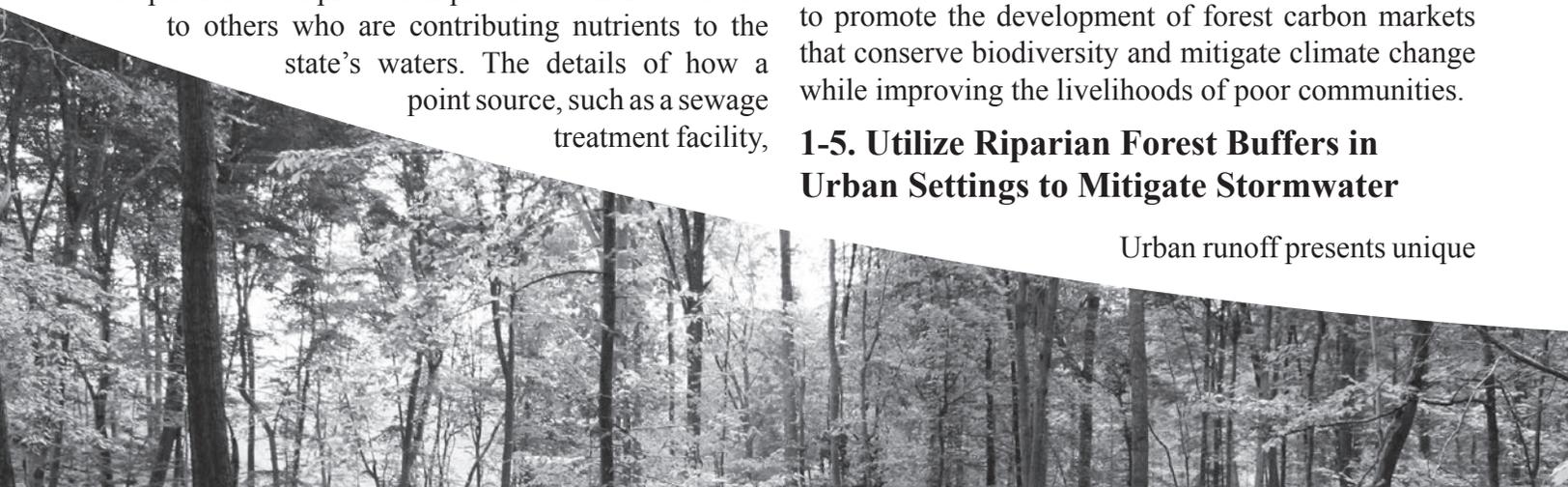
can trade with a nonpoint source, such as areas of farms and forest, have yet to be determined. The State's DEQ is advising localities that surveys should be conducted now to describe the baseline condition of streams. Any improvements made to riparian areas can be credited against point sources of pollution from wastewater treatment facilities and other industrial loadings. Priority areas for effectiveness and likelihood of success should be presented to stakeholders, such as Soil and Water Conservation Districts and local governments seeking nutrient trading credits.

1-4. Develop Compensation Value for Ecosystem Services of RFB

As researchers continue to validate the actual benefits our forests provide, landowners will be compensated for maintaining land uses that provide ecological benefits. As localities begin to appreciate the importance of riparian buffers for drinking water protection, recreational uses, and quality of life, they will incorporate these values into comprehensive land use and capital improvement plans. Increased funding can be made available for landowners to plant riparian buffers for the services they provide the community as a whole. On an international level, leading experts from forest and energy industries, research institutions, the financial world, and environmental NGOs are dedicated to advancing markets for some of the ecosystem services provided by forests – such as watershed protection, biodiversity habitat, and carbon storage. The VDOF is working in cooperation with the USDA Forest Service to develop forest-based ecosystem services values. Also, enabling legislation to establish new market institutions, developing strategies for pricing and marketing, and monitoring performance are also being considered. One initiative, the Forest Climate Alliance, has brought environmental and rural development leaders together to promote the development of forest carbon markets that conserve biodiversity and mitigate climate change while improving the livelihoods of poor communities.

1-5. Utilize Riparian Forest Buffers in Urban Settings to Mitigate Stormwater

Urban runoff presents unique



problems for stream health. Increased flow velocities destabilize stream channels and increase sediment delivery downstream. Urban runoff contains a high and varied contaminant load. While buffers immediately adjacent to streams are still important in urban stream corridors, expansion of UTC throughout the landscape to mitigate stormwater runoff is needed to augment buffer function beyond the riparian corridor. Tree canopies are effective at intercepting rainwater and reducing raindrop impact. Use of aerial imagery can be used to identify areas with low percent age canopy and reveal opportunities for tree plantings. Implementation of Low Impact Development (LID) practices, including vegetative practices such as rain gardens that are designed to intercept and promote the infiltration of surface runoff, will lessen the velocities and quantities of waters reaching streams and rivers.

1-6. Increase Technical Delivery

Successful implementation is dependent on qualified professionals getting good land management practices on the ground. To expand the technical base of expertise in establishing and maintaining forest buffers, regular training must be available on buffer function, establishment and maintenance, including invasive species, for professionals and volunteer organizations. This can be accomplished by establishing self-training materials and regular workshops for natural resource professionals and local government decision makers. Furthermore, increasing staff to deliver technical guidance is critical to achieving the overall Virginia goal.

1-7. Regulatory Controls

Although incentive-based and voluntary programs can contribute significantly to achieving our buffer goals, local ordinances and state legislation can provide additional tools to restore missing or inadequate buffers. A model ordinance for effective buffer restoration can be made available to localities wanting to utilize such tools. The state legislature needs to provide the necessary language to allow localities to adopt and enforce rules requiring reestablishment of forested buffers.



Objective 2 – Conserve Existing Riparian Buffers

Conserve existing forests along streams and shorelines.

This initiative addresses existing conservation mechanisms, introduces new ones, and promotes an integrated watershed management program to address riparian buffer protection.

Conservation strategies protect existing riparian buffers as well as newly established buffers, creating substantial long-term benefits. Strategies can include protecting water quality and living resources, maintaining geomorphological stream stability, reducing stream restoration costs, and furnishing greater flood protection.



Riparian buffers can be conserved as part of broad environmental management programs such as state and Federal mandates for pollution control, state partnerships for restoration of the Chesapeake Bay,

protect important natural resources.

Virginia Conservation Lands Needs Assessment



A critical component of our buffer conservation effort is to inventory lands adjacent to waterways and their protected status. Conserved lands are tracked through the DCR's Division of Natural Heritage as part of the Virginia Conservation Lands Needs Assessment (VCLNA) program.

The VCLNA is a flexible, widely applicable tool for integrating and coordinating the needs and strategies of different conservation interests, using GIS (Geographic Information System) to model and map land conservation priorities and actions in Virginia. The VCLNA allows the manipulation of issue-specific data sets that can be weighted and overlaid to reflect the needs and concerns of a variety

and other land conservation programs. Riparian buffer conservation can be assured through numerous public or public/private partnerships, and new incentives.

In Virginia, many of the land-use decisions are made by local governments, so much of the discussion here relates particularly to efforts at a local scale.

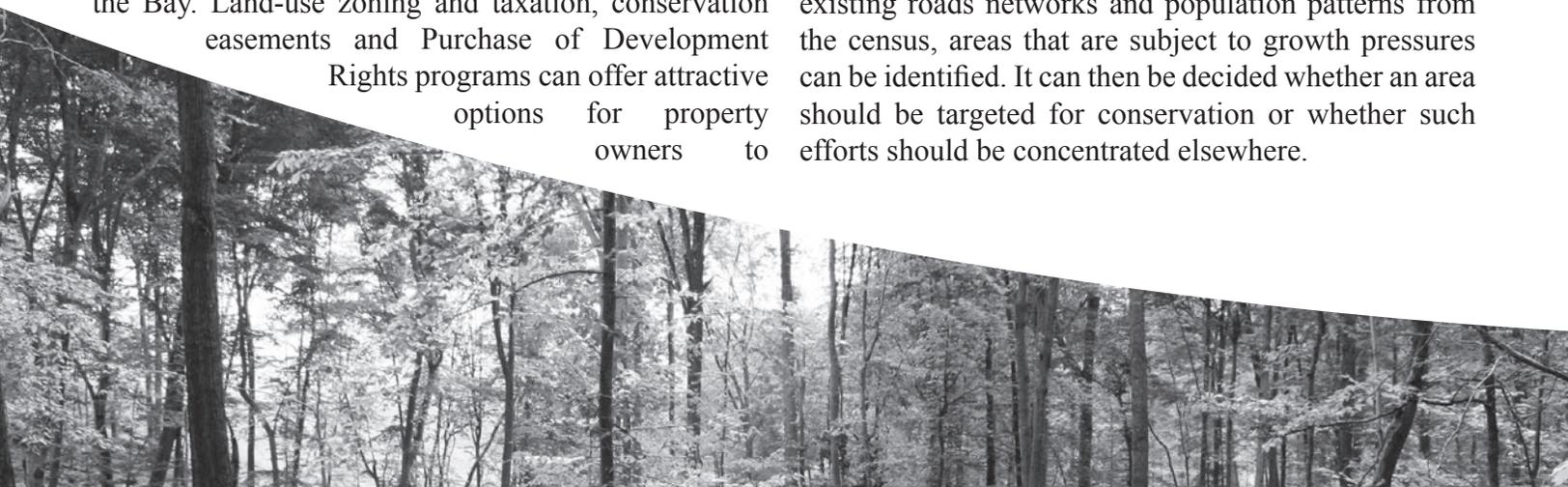
Existing Endeavors

Virginia has a variety of conservation programs, regulatory and voluntary, that provide a basis for the conservation of stream buffers throughout the state. A portion of the state's jurisdictions must comply with the Chesapeake Bay Preservation Act and enforce protection of the zones adjacent to streams, rivers and the Bay. Land-use zoning and taxation, conservation easements and Purchase of Development Rights programs can offer attractive options for property owners to

of conservation partners - issues like:

- unfragmented natural habitats
- natural heritage resources
- outdoor recreation
- prime agricultural lands
- cultural and historic resources
- sustainable forestry
- water quality improvement
- drinking water protection

Of particular interest is the mapping tool that can estimate an area's vulnerability to development pressure. By using existing roads networks and population patterns from the census, areas that are subject to growth pressures can be identified. It can then be decided whether an area should be targeted for conservation or whether such efforts should be concentrated elsewhere.



Virginia's Chesapeake Bay Preservation Act

Virginia's Chesapeake Bay Preservation Act requires localities throughout the eastern portion of the state to identify those "resource protection areas" and "resource management areas" that deserve protection. In most cases, localities have identified all perennial streams, rivers and bays, as well as wetlands as areas needing buffers. Any encroachment on the buffer zone or disturbing the natural vegetation must be reviewed and, when permitted, has to be mitigated by the installation of Best Management Practices to ameliorate the negative impacts.

Forestry for the Bay

The newly created Forestry for the Bay Program is a partnership of the Alliance for the Bay, USDA Forest Service, state forestry departments and the Chesapeake Bay Program, that focuses on landowners with smaller acreages, lands that may be vulnerable to further forest loss through development. By educating landowners with smaller properties of the value of trees and how to manage them, forest lands, particularly riparian forests can be conserved.

Virginia Land Conservation Foundation (VLCF)

In 1999, the General Assembly and Gov. Jim Gilmore established the Virginia Land Conservation Fund to help fund the protection of Virginia's natural resources. The foundation makes matching grants to state agencies, local governments, public entities, and nonprofit groups for purchasing fee simple title to and interests in real property for land conservation purposes. The four grant categories are: Open Spaces and Parks; Natural Area Protection; Historic Area Preservation; and Farmlands and Forest Preservation. Part of the VLCF's mandate is to do conservation planning on a statewide basis. The Code of Virginia directs the VLCF to prepare a comprehensive plan "that recognizes and seeks to implement all of the purposes for which the Foundation is created." The law directs the VLCF to:

- develop a strategic plan for the expenditure of unrestricted monies;

- develop an inventory of those properties in which the Commonwealth holds a legal interest for the protection or preservation of ecological, cultural or historical resources, lands for recreational purposes, state forest lands, and lands for threatened or endangered species, fish and wildlife habitat, natural areas, agricultural and forestal lands and open space;
- develop a needs assessment for the future.

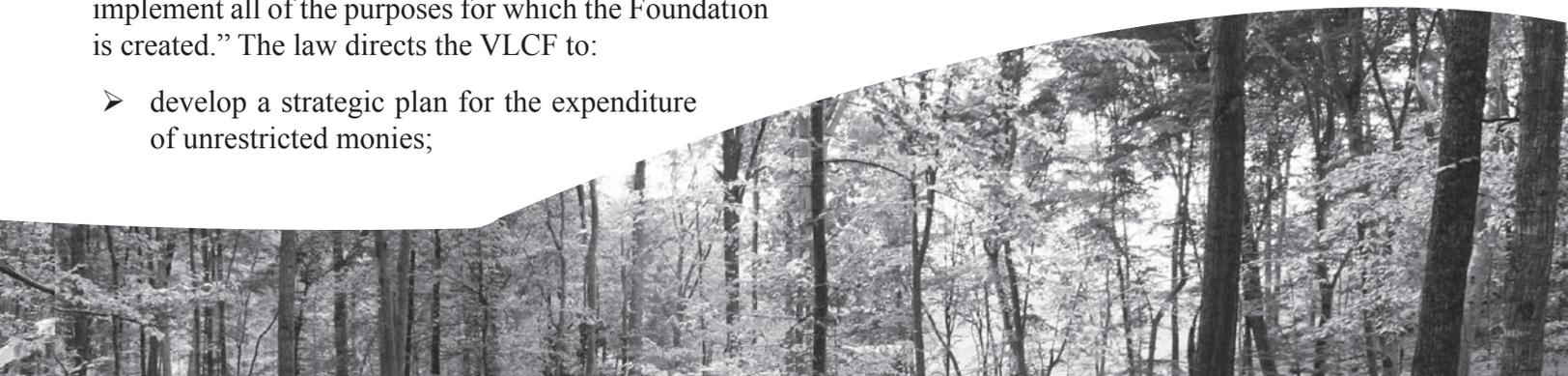
Strategies

2-1. Consider developing a Virginia Forest Protection Act

Virginia can follow Maryland's example and adopt a program for protecting existing forested areas. Maryland's Forest Conservation Act (FCA) aims to conserve forest cover on development sites by establishing rules that minimize the loss of existing forests and, in some cases, replenish forest that has been lost to development activities in the past. By reviewing development plans for their compliance with such a Forest Conservation Act and by monitoring forest protection during construction, we can help ensure forests are protected as fully as possible. Such an approach will require enabling legislation.

2-2. Standardize Riparian Tax Incentives

Standardize Riparian Tax Incentives across the Commonwealth should be used to promote buffer conservation. Landowners could receive reduced land-use valuation assessments on areas that are permanently dedicated to vegetated buffers. There is a misconception that protecting a streamside zone necessarily means that the public will have access to that property. This is not the case; yet the benefits gained through buffer conservation will be realized many times over the investment the taxpayers of the Commonwealth provide.



2-3. Develop An Urban Forest Buffer and/or Canopy Cost-Share Program

There is no state or Federal agency that specifically administers a program for urban best management practices. While the programs that support and direct conservation on agricultural lands have a successful track record, urban areas have not benefited from that same focus. Many of the requirements for stormwater protection and erosion and sediment control typically apply to new construction only. No programs address retrofitting areas with BMPs or providing cost-share assistance in an urban area or on small parcels of land. Many of the efforts on urban lands are funded through small grants to nonprofit conservation and civic organizations. As lands become increasingly subdivided, and fragmented, traditional program delivery to agriculture and forestal lands will be ineffectual. Funding needs to be directed to promote conservation on these lands in a manner similar to the Agricultural Best Management Practices Cost-Share program.

2-4. Utilize the VCLNA or Similar GIS Program to Track RFB Loss

Utilize the VCLNA or similar GIS program to track RFB loss through the Virginia Conservation Lands Needs Assessment (VCLNA) program. To evaluate where conservation efforts must be focused, a tracking system needs to be developed to identify the rate of loss of riparian buffers. Establish a prioritization of replacing the most beneficial buffers within a framework of limited technical staffs and budgets.

2-5. Institute, Where Appropriate, Regulatory Controls to Limit RFB Loss

Encourage localities to conserve existing forest buffers through ordinances; provide sample ordinances to decrease the losses of existing buffers that occur through development, agriculture,

forestry and other land conversion practices. The Virginia Land Conservation Foundation (VLCF) is among the mechanisms that could be used to enhance coordination of the conservation activities taking place in the state. With its broad, ambitious scope and the statutory participation of Virginia's natural resources related agencies, the VLCF could serve an important role as an umbrella for advancing strategic conservation in Virginia. The state legislature needs to adopt enabling legislation to allow localities to adopt and enforce such rules.

Objective 3 – Enhance Program Coordination and Accountability

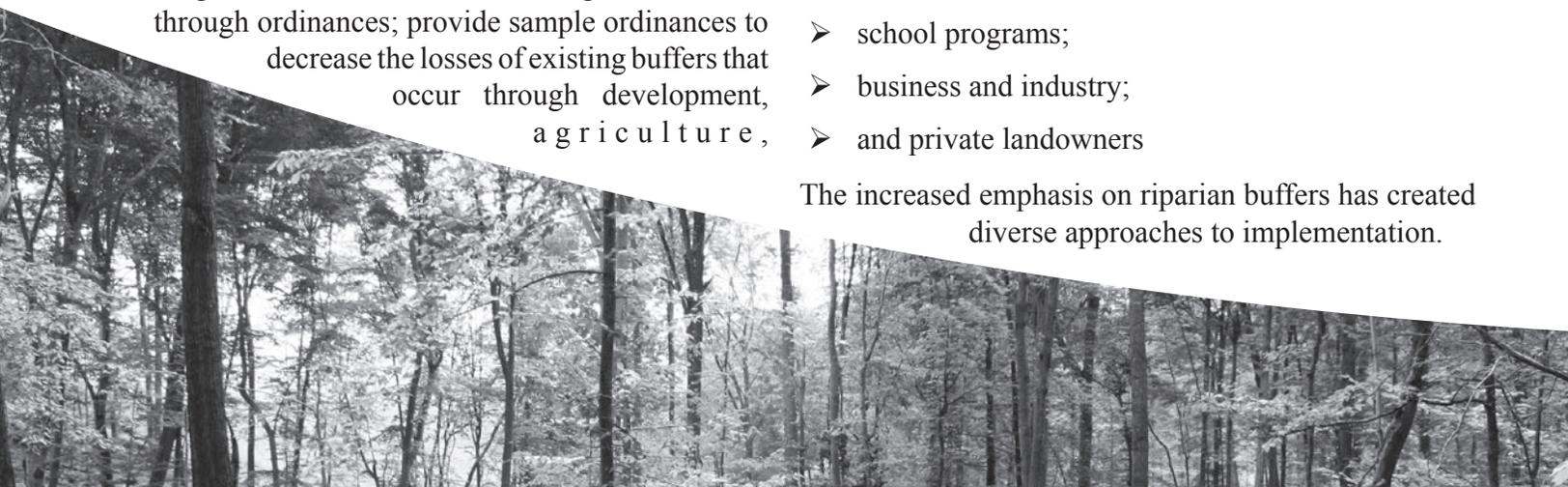
Establish mechanisms to streamline, enhance, and coordinate existing programs related to riparian buffers and riparian system conservation.

This initiative describes the multiple programs involved in Virginia's riparian buffer efforts and sets forth ways to effectively coordinate them. It identifies roles, develops public education strategies, establishes tracking mechanisms, and promotes volunteer and private commitment.

An array of programs, agencies and individuals are involved in conserving or creating riparian buffers. The partners who contribute to this Implementation Plan include:

- local, state and Federal government;
- Soil and Water Conservation Districts and Planning District Commissions;
- conservation organizations, land trusts, community associations, service organizations;
- school programs;
- business and industry;
- and private landowners

The increased emphasis on riparian buffers has created diverse approaches to implementation.



Existing Endeavors

The Department of Forestry provides advice to landowners in site and species selection for tree planting. The two state nurseries provide seedlings for reforestation and conservation projects across the state. The VDOF foresters are recognized by the Natural Resources Conservation Service as the technical expert for making planting recommendations for the CREP program.

The Virginia Coastal Program, a network of partners coordinated through the Virginia Department of Environmental Quality (DEQ), is also involved in identifying the best remaining coastal resources, including forested riparian buffers. It has contracted with DCR's Natural Heritage Program to undertake the Virginia Conservation Lands Needs Assessment (VCLNA) for the Coastal Zone, which identifies ecologically significant cores and corridors that can be prioritized for various protection and management needs. One goal of VCLNA is to train coastal planning district commissions to use this tool, so that they, in turn, can help local communities develop a picture of important areas that should be protected. VCLNA also has set a goal to involve agencies in the development of complementary data sets to address a broad range of protection objectives.

The Department of Environmental Quality and the U.S. Army Corps of Engineers require the replacement of riparian function and values whenever jurisdictional waters are impacted by any type of development. Typically mitigation sites are required to have vegetated buffers a minimum of 100 feet on each side of a stream and these plantings must be permanently protected through some legal instrument, such as a permanent conservation easement or similar restriction, recorded with the deed of the property.

The Department of Conservation and Recreation (DCR) has land and water conservation as a priority and is the lead agency for the Virginia Outdoors Plan and the

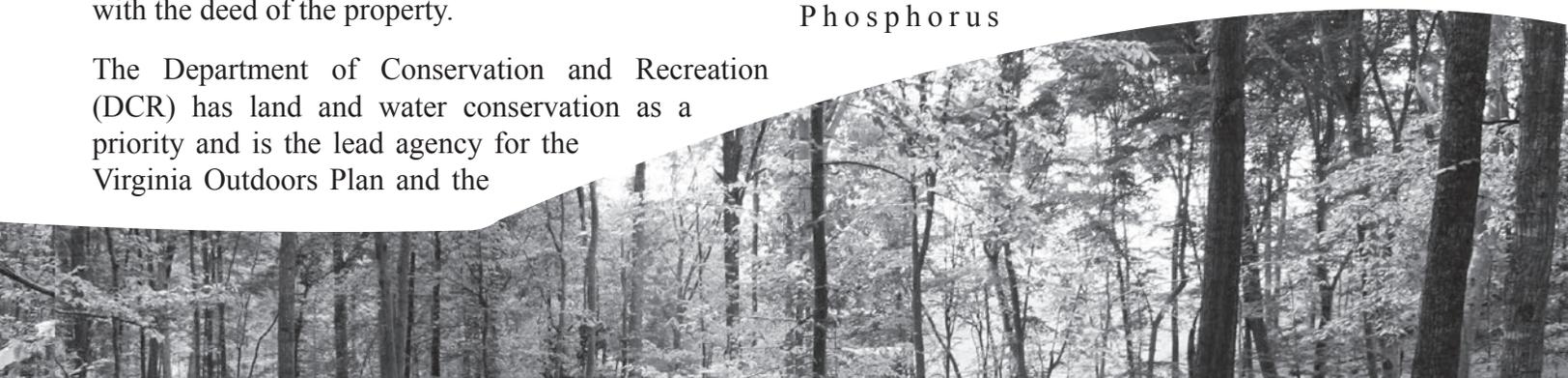
Virginia Land Conservation Foundation. Through the Conservation Reserve Enhancement Program (CREP) and other programs, DCR promotes the establishment of forested riparian buffers. The Virginia Outdoors Plan provides a good starting point for a statewide conservation planning initiative, particularly in offering specific land conservation recommendations for each



planning district commission, but it remains focused primarily on recreation.

The Department of Conservation and Recreation (DCR) administers the Stormwater Management program in the state, and more emphasis is now being placed on preserving existing riparian buffers, and giving credits in site development designs to preserving trees when calculating runoff hydrology. Too often the regulations requiring stormwater ponds result in the development sites having their existing riparian vegetation cleared to accommodate these detention facilities.

DCR administers the Nutrient Management to provide guidance on the application of nutrients to agricultural and other lands. A newly adopted
P h o s p h o r u s



index prescribes where phosphorus fertilizer may be applied so that no excess is delivered to surface and groundwaters. For example, steep slopes with poor infiltration would likely lose phosphorus in runoff events faster than gentle slopes with higher infiltrative capacity. Similarly, buffered areas can effectively filter phosphorus and slow storm water runoff velocities, and this is accounted for in the index. An agricultural operation incorporates this into the plan for the whole farm operation, thus discouraging removal of existing buffers, and encouraging the establishment of new ones.

The primary mission of the Virginia Department of Game and Inland Fisheries (DGIF) is to manage wildlife and inland fish populations to serve the needs of the Commonwealth. DGIF offers a wide array of programs, publications, training and educational opportunities, and technical assistance on species conservation and management. Habitat preservation is the focus of DGIF's Comprehensive Wildlife Conservation Strategy, an initiative mandated by the Federal Conservation and Reinvestment Act (CARA). DGIF's Fish and Wildlife Information Service (VAFWIS), Aquatic GAP project, Anadromous Fish database, and Threatened and Endangered Species Waters database provide critical information on aquatic and terrestrial species locations. In addition, DGIF's work on the Comprehensive Wildlife Conservation Strategy brings together federal, state, regional, local, and private partners to review current wildlife status and trends in land protection and develops implementation strategies. The Strategy helps partners prioritize projects and show the need for additional funding. The Department employs three Stream Restoration Biologists that implement natural stream channel design projects, including bioengineering and buffer plantings, on the ground.

The Virginia Department of Transportation (VDOT) has funded several programs to gather data on Virginia's landscapes and is pursuing a plan to

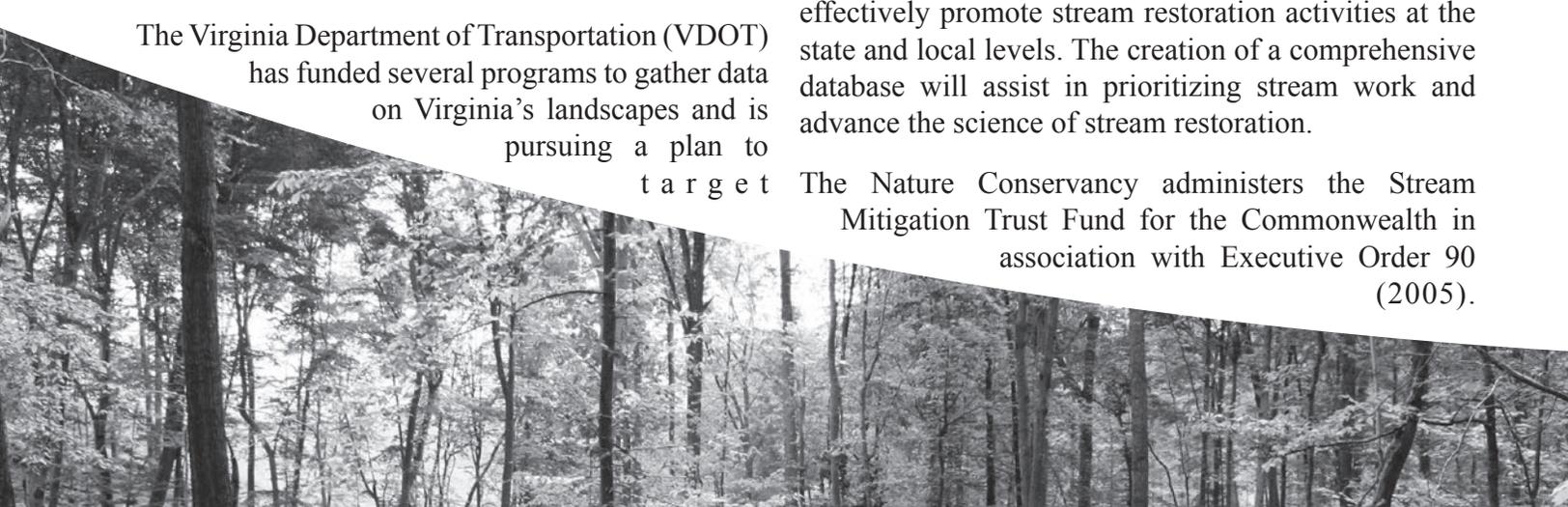
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restoration projects to fulfill their mitigation responsibilities when highway construction projects impact streams and wetlands.



The Virginia Stream Alliance—formally created through the Governor's Executive Order 90 (2005)—coordinates a Stream Restoration Initiative for the Commonwealth of Virginia. This Alliance facilitates cooperation among both government and non-government entities to effectively promote stream restoration activities at the state and local levels. The creation of a comprehensive database will assist in prioritizing stream work and advance the science of stream restoration.

The Nature Conservancy administers the Stream Mitigation Trust Fund for the Commonwealth in association with Executive Order 90 (2005).



Developers whose projects impact streams have the option of mitigating onsite or paying into the fund. The Nature Conservancy uses the money to do stream restoration projects, which include vegetated buffers.

DCR, Division of Chesapeake Bay Local Assistance (DCBLA) administers the Chesapeake Bay Preservation Act, which applies to the eastern portion of the state, requires streamside buffers be protected, or that their function be replaced if impacted. Counties west of the fall line can adopt some or part of these regulations.

Fauquier County is exploring the possibility of adopting a conservation easement program emphasizing riparian buffers. It is considering that reductions to nonpoint source water pollutant loading resulting from riparian buffer establishment may be credited in the evolving “Nutrient Trading Program.” Permit requirements for point source discharges, such as sewage treatment plants, dictate allowable nutrient levels in effluent, and applying Best Management Practices throughout the county may be more cost effective than treatment plant infrastructure upgrades. Localities are being encouraged by the Department of Environmental Quality to evaluate the conditions of their streams and buffers to serve as a baseline for future trading scenario calculations.

The Virginia Outdoors Foundation is responsible for administering a Conservation Easement program and authors the restrictions or covenants that are written into enforceable documents. The VOF holds perpetual easements on properties for their value to the Commonwealth, as they possess open space, scenic, historic, cultural, and wildlife value. The easements are now being written with language to specifically address activities in the riparian zone, thus recognizing the significance of these areas and their effect on water quality.

The Virginia Department of Health (VDH) is the state’s primary agency for drinking water and is required by the Safe Drinking Water Act (SDWA) to develop a Source Water Assessment Program (SWAP). The SWAP includes delineating the boundaries of a source’s assessment area; performing an inventory of land use activities of concern, and determining a relative susceptibility of the

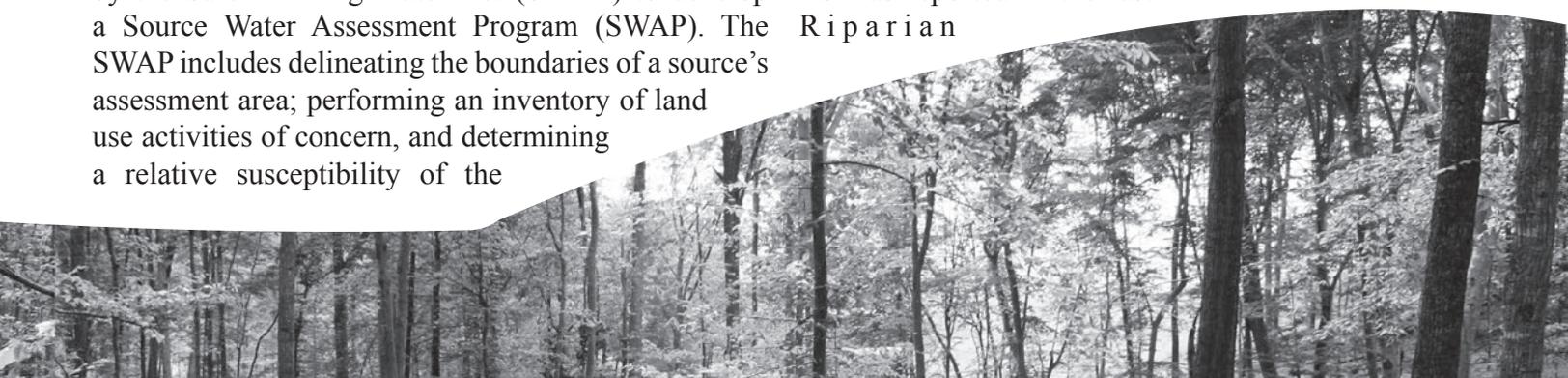
source to contamination from the activities within the source area. Buffers are recognized for their importance in maintaining the high level of water quality protection that citizens demand and deserve.

A number of statewide and regional conservation nonprofits and other nongovernmental organizations work with the Commonwealth agencies on conservation initiatives. The Conservation Fund, The Nature Conservancy, the Trust for Public Land, and Virginia’s United Land Trusts (VaULT) all work on conserving natural resources in Virginia.

VaULT’s held a series of six regional Linking Lands Workshops in 2002, which was cosponsored by VDOF, DCR, DGIF, the Virginia Department of Historic Resources, Scenic Virginia, and Preservation Alliance of Virginia. The workshops produced a series of recommendations for conservation actions. A consistent priority was the designation and protection of riparian corridors and their related resources. Whether greenways, blueways, trails, or rivers, the participants were interested in mitigating impacts or buffering the corridors from future impacts. Frequently the driving force behind conserving waterways and their adjacent riparian habitats was for protecting water quality and second, for its recreational and experiential value.

In January 2004, VaULT published “Heritage Virginia: A Strategic Plan for the Conservation of the Commonwealth’s Natural and Cultural Resources” that identifies statewide strategies designed to give guidance to Virginia’s private, non-profit land trust community – working together and in concert with state, regional, and local governments; business and industry; and community organizations—to conserve Virginia’s heritage. A strategic approach that includes maps, such as those generated by DCR’s Virginia Conservation Lands Needs Assessment, can help Virginia integrate conservation action and target priority areas.

As was reported in the last
Riparian



Buffer Implementation Plan, an analysis was conducted by the Chesapeake Bay Commission to identify and compare major Bay state riparian forest buffer programs. While significant progress has been made, some of the key findings still apply:

- Few existing programs provide a specific riparian forest buffer focus
- Many programs are unnecessarily bureaucratic, complicated and burdensome to administer;
- Many agencies and conservation groups are involved in riparian forest buffer activity, with varying support levels, and
- Forming the Virginia Riparian Forest Buffer Panel early in the Chesapeake Bay

The Riparian Forest Buffer Panel process has enhanced coordination among agencies and conservation groups. Where many other conservation programs address riparian buffers in some manner, buffers are the principle focus in only a few.

Some challenges that still face Virginia's natural resource agencies and conservation nonprofits are a lack of consistent state funding and an effective mechanism for coordinating and integrating their efforts. There is no overriding framework for making decisions about what riparian areas are to be prioritized for protection. This leaves the many organizations involved in Virginia conservation working with different, and sometimes overlapping agendas. This can be extremely detrimental to obtaining legislative support for conservation initiatives and programs, as well as for securing adequate funding for natural resource protection.

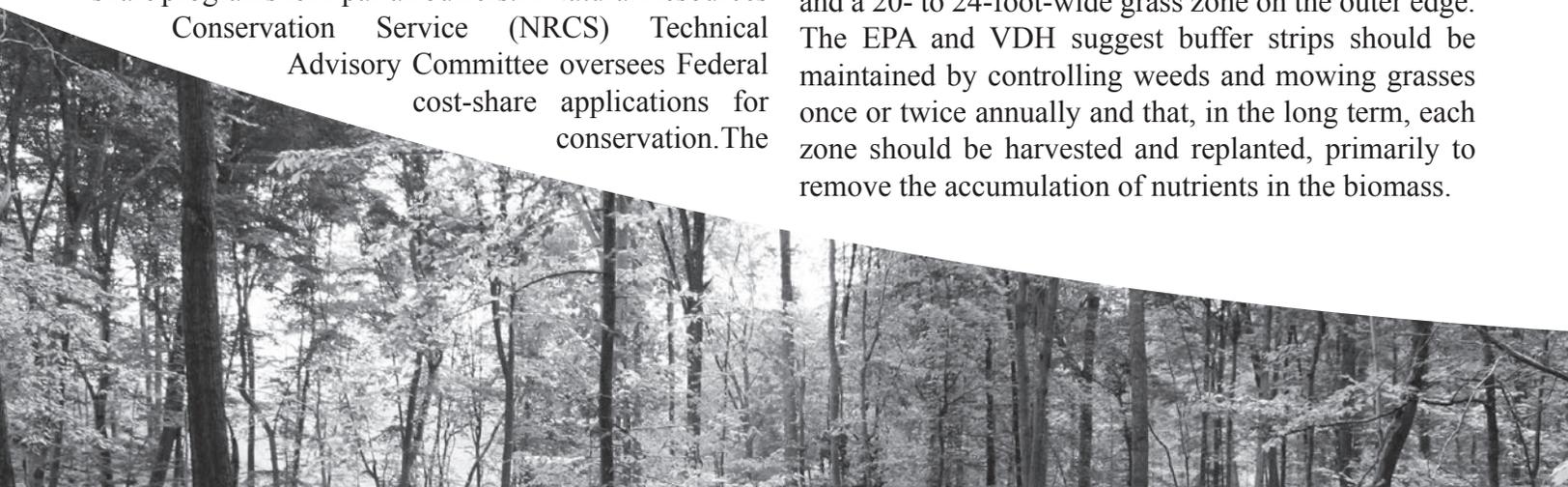
Duplication remains prevalent among some conservation programs. This is especially noticeable in financial cost-share programs for riparian buffers. A Natural Resources Conservation Service (NRCS) Technical Advisory Committee oversees Federal cost-share applications for conservation. The

Virginia Department of Conservation and Recreation administers the state Agricultural Best Management Practices cost-share program and the Virginia Water Quality Improvement Act grant program. Some efficiency may be gained through sharing experiences, information and resources.

The Department of Environmental Quality restricts any harvesting in riparian buffer zones required for their Virginia Water Protection Permits. In contrast, the Department Forestry and the Forestry Workgroup of the EPA's Chesapeake Bay Program encourage active management of "working forests" that would allow harvests of up to 50 percent of the buffer canopy, which is also allowed in the 50-foot-wide streamside management zone according to VDOF best management practice guidelines.

Stream buffers on private property that are offered for mitigation may make that land ineligible for other riparian cost-share programs as this is viewed as "double-dipping." This may discourage willing landowners from pursuing even more extensive buffers.

There are varying opinions and requirements for buffer widths depending on whom you ask and on the specific program. DEQ/Corps permits require 100-foot buffers on each side in most cases, regardless of the size of the stream. The Chesapeake Bay Preservation Act allows farming to within 25 feet with appropriate BMP controls. The Chesapeake Bay Tributary strategy counts all new buffers established at 35 feet or wider. Issues arise when 25-foot buffers cannot be counted toward the Chesapeake Bay riparian buffer goal. The Source Water Protection Program recommends a combination of trees, shrubs, and grasses planted parallel to a stream consisting of three zones – about four or five rows of trees closest to the stream, one or two rows of shrubs, and a 20- to 24-foot-wide grass zone on the outer edge. The EPA and VDH suggest buffer strips should be maintained by controlling weeds and mowing grasses once or twice annually and that, in the long term, each zone should be harvested and replanted, primarily to remove the accumulation of nutrients in the biomass.



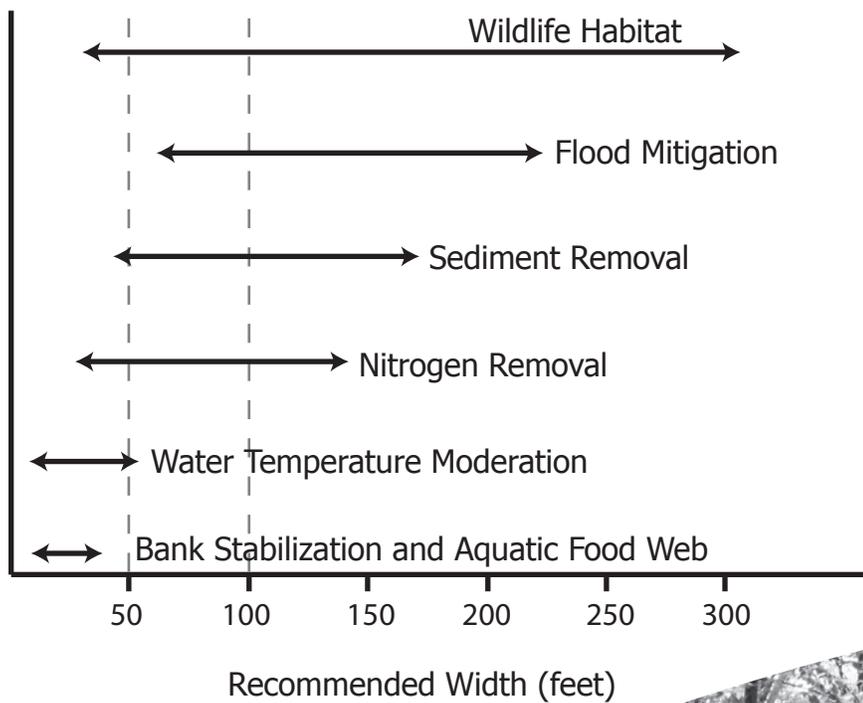
The optimal buffer width is site specific and is dependent on the desired buffer function. Scientific literature suggests wider buffers are better – generally in excess of 75 to 100 feet to achieve both water quality and wildlife habitat objectives. For wildlife migration corridors, 300 feet is probably more appropriate. For buffers to provide solely stream bank protection and shading, only tens of feet may suffice. The key questions in determining appropriate buffer width are:

- What are the desired functions of the buffer?
- What are the physical characteristics of the riparian area?
- How “valuable” is the stream resource?
- How intensive are land uses in the watershed and adjacent to the buffer?

In most cases, as buffer width increases it performs a greater variety of functions.

Desirable buffer width is in part determined by the functional value of the water resource being buffered.

Figure 3. Minimum Recommended Buffer Widths for Different Functions

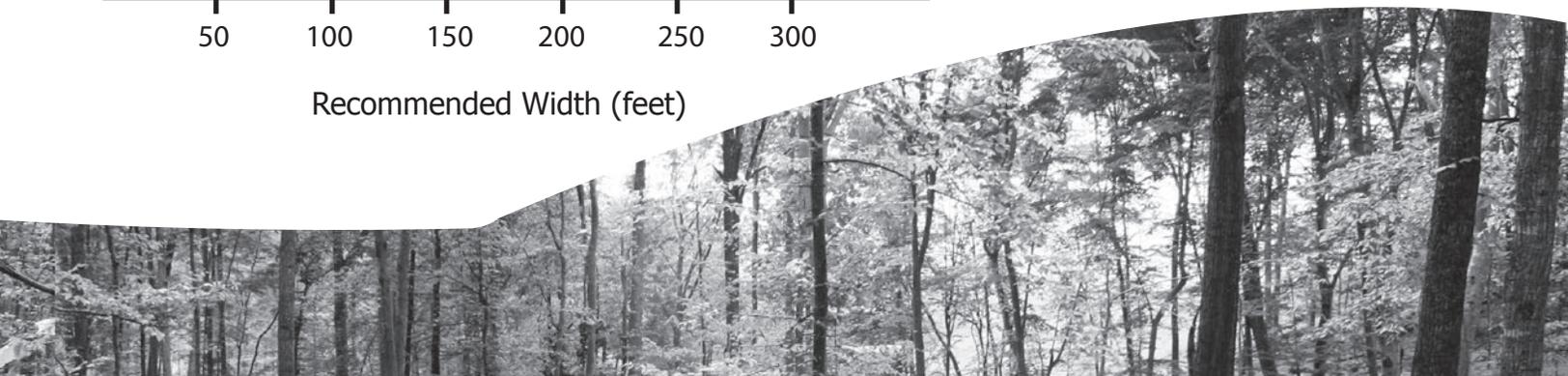


For example, streams that provide municipal drinking water or provide passage to migratory fish may be viewed as more “valuable” than others and may require greater buffering and protection. As land-use activities in the watershed increase in their intensity and magnitude, the impacts of these land uses on water quality also increase. Restoring and conserving wider buffers that offer more functional benefits can help to mitigate for the increasing intensity of land use in the watershed.

There is little recognition of the benefits of narrower buffers, to the extent that they are excluded from consideration in reporting mileage goals or eligibility for cost-sharing. Some farmers are reluctant to restrict or end their cropping or livestock operations on their limited areas of level and gently sloping lands adjacent to water bodies, particularly in the Piedmont and mountain counties. Existing development and gray infrastructure often limits the width of riparian areas available for restoration in urban areas. Any buffer is better than no buffer. Cost-share programs should be available,

at a reduced rate of compensation, for narrower buffers, even though this may not be recognized as being as effective in nonpoint source pollutant reduction as wider buffers.

The Chesapeake Bay Agreement calls for the Bay states to report all new riparian buffer establishment. While the cost-shared practices, such as those through the Department of Conservation and Recreation, Soil and Water Conservation Districts, and the Natural Resources Conservation Service, are tallied annually, those projects initiated by nonprofits, schools, civic groups and the like do not routinely report their projects, nor is there any real incentive for them to do so.



Green Infrastructure principles encourage communities to focus on preserving connected/contiguous corridors for environmental improvement, recreation or aesthetic uses. The Rivers, Trails, and Conservation Assistance Program, also known as the Rivers & Trails Program or RTCA, is the community assistance arm of the National

current conservation-related efforts taking place in Virginia toward a statewide strategic approach to conservation.

3-2. Continue with the Virginia Conservation Lands Needs Assessment

The Virginia Conservation Lands Needs Assessment should serve as the foundation for identifying critical conservation lands. The Virginia Department of Conservation and Recreation and other state agencies should support periodic re-running of the Needs Assessment model as new and updated data becomes available.

3-3. Enhance Critical Spatial Data for Conservation

The Virginia Departments of Conservation and Recreation, Forestry, Game and Inland Fisheries, and Transportation, and other state agencies should continue to invest in the maintenance and enhancement of critical spatial data for conservation,

including the Conservation Lands and Sites layers, the Virginia Fish and Wildlife Information Service, and other spatial databases.

3-4. Coordination Conservation Programs Among Agencies

There are several mechanisms by which Virginia can coordinate its conservation programs and maximize related resources. The Land Conservation Coordination Workgroup (chaired by the Director of DCR) provides a forum for directors of the agencies with land conservation programs (namely DCR, VDOF, DGIF, the Department of Agriculture and Consumer Services, the Department of Historic Resources, and the Virginia Outdoor Foundation) to meet periodically to discuss land conservation issues. The Coastal Policy Team (consisting of agencies under the Secretary of Natural Resources, as well as the Departments of Health, Forestry, Economic Development, and Transportation) can identify and address issues that cut

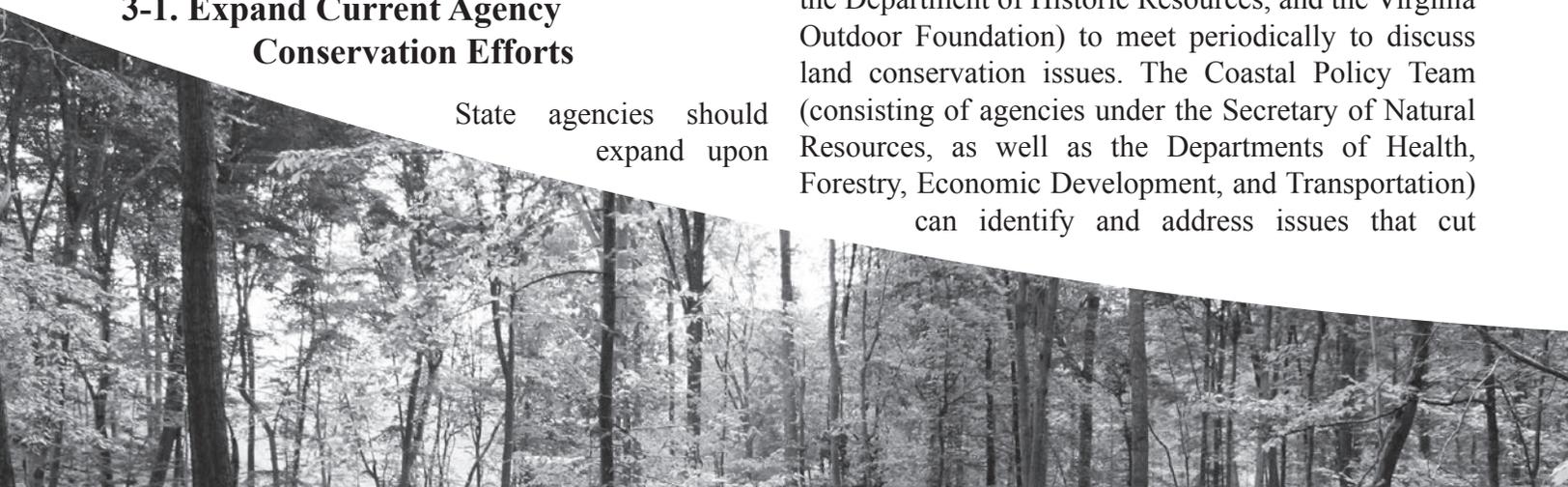


Park Service. RTCA staff provides technical assistance to community groups and local, state, and Federal government agencies so they can conserve rivers, preserve open space, and develop trails and greenways. On the other hand, the NRCS restricts some recreational uses of CREP buffers. This can be as extreme as prohibiting someone from putting a bench in a buffer from which to view wildlife. No trails are allowed. This is in opposition to the Blueways/Greenways approach where there is an emphasis on the enjoyment of the water resource. The more people that are aware of their water resources, the more value they attribute to them.

Strategies

3-1. Expand Current Agency Conservation Efforts

State agencies should expand upon



across agency jurisdictions (e.g., habitat restoration, ecotourism development, stormwater management).

3-5. Cooperatively Build Local Government Tools

Cooperatively build local government tools (model ordinances, policy guidelines, brochures, and similar vehicles) to address mutual riparian buffer policy challenges in a consistent and cost-effective manner.

3-6. Establish Processes for Localities to Approach Buffer Protection

Establish a process to highlight sound buffer protection approaches adopted by individual localities. Disseminate the model practice to other local governments.

3-7. Engage Local and Regional Officials

Engage more local and regional elected officials and decision makers in the process of meeting riparian buffer goals. Make the goals resonate with community leaders at their local level.

3-8. Develop Plans for Localities to Transition from Riparian Buffer Effort to Comprehensive Plans and Policies

Further develop riparian buffers as a regional water quality concept and develop tools for transitioning the concepts into local comprehensive plans and policies.

3-9. Integrate Riparian Buffers into Existing Comprehensive Plans

Develop, using existing comprehensive plans, sample language that can be used by other local governments to further integrate riparian buffers into comprehensive plans

3-10. Involve Diverse Stakeholders as Partners

Involve diverse stakeholders as partners. It is important to involve the people who will be affected, including key landowners, elected officials and other community leaders, developers, conservationists, and other interested citizens.

3-11. Encourage Passive Recreational Use of Buffers

Recreational uses of buffers should be allowed, including trails and wildlife viewing, as long as impervious material is kept to a minimum and vegetation is managed.

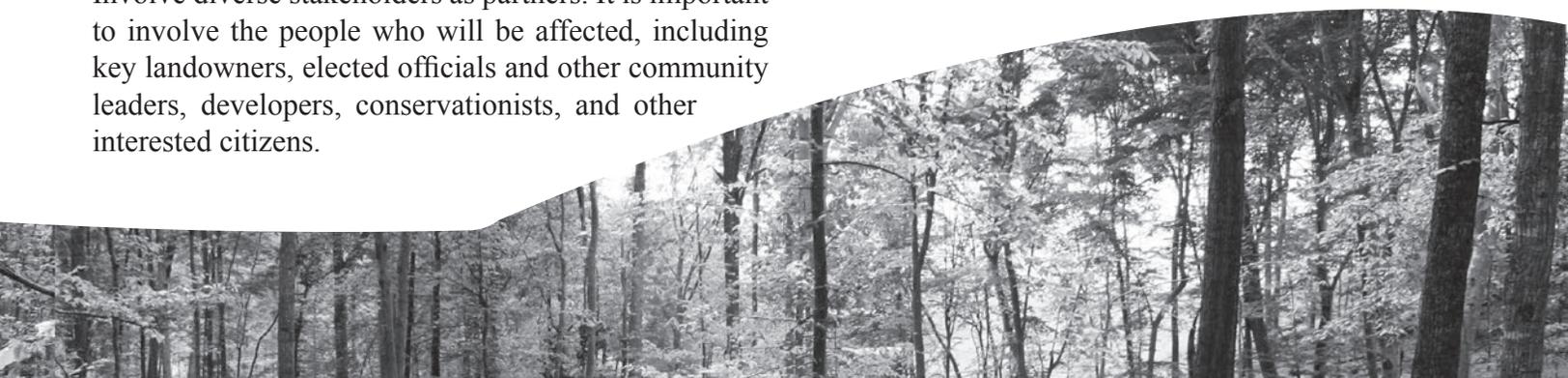
Objective 4 – Enhance Incentives

Develop and promote an adequate array of incentives for landowners and developers to encourage voluntary riparian buffer retention and restoration.

This initiative identifies innovative funding sources, recommends local tax incentive legislation, and enhances funding alternatives to energize voluntary alliances in riparian buffer protection across Virginia. In most respects, this undertaking is voluntary. Even where regulations apply locally, such as the Chesapeake Bay Preservation Act requirements, a key element to the program's success is incentives, designed to prompt large-scale participation. Previously, these incentives have been offered by a mix of federal, state and local agencies, businesses and private non-profit organizations. Examples of these incentives are the Federal Government's Conservation Reserve Enhancement Program (CREP), Virginia's Chesapeake Bay Cost-Share Program and Use-Value Taxation.

Incentives may take many forms:

- Formal recognition expressing Virginia's appreciation for a landowner's cooperation—for example, a Governor's citation granted to participating landowners who do not request funding assistance
- Grants and cost-share payments



- Rent payments for land taken out of production or used for conservation
- Payment for seedlings and other supplies
- Low-interest loans, loan guarantees and easement purchases
- Tax incentives

The entire incentive spectrum will be considered, although tax incentives and grants are generally recognized as the most effective. The major incentive categories are direct financial aid and tax/zoning enticements. Recently state and Federal cost-share programs have emphasized riparian buffers.

The majority of lands in the state are privately owned, and there has to be an appreciation for that fact in providing incentives to these landowners. Essentially, there are no conservation successes without participation of Virginia landowners. Programs cannot be so onerous or complicated that landowners shy away from them. The number and variety of cost-share programs confuses landowners and they may hesitate to participate for fear of missing out on the “best deal.”

Existing Endeavors

Funding for Land and Water Conservation in Virginia

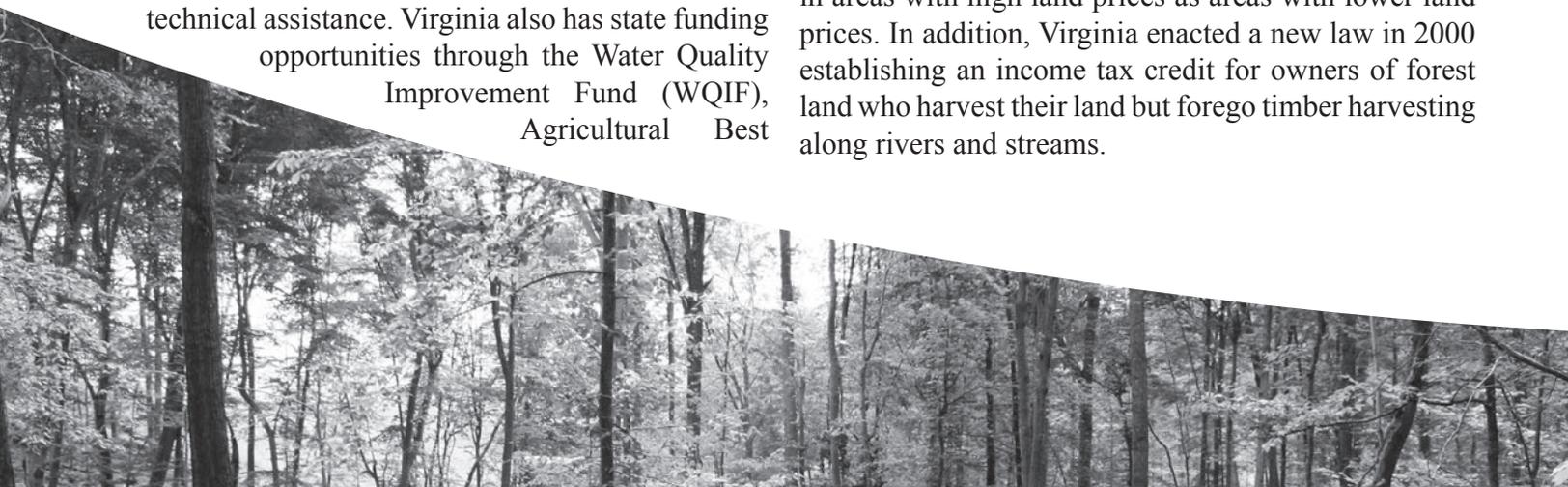
There is a range of funding sources available from various sectors to support conservation initiatives in Virginia. For example, the USDA Forest Service, the National Park Service, the U.S. Fish and Wildlife Service, the Department of Transportation, the Natural Resources Conservation Service (NRCS), the National Oceanic and Atmospheric Administration (NOAA), and others have programs in place that make available to states and localities a range of funding, training, and technical assistance. Virginia also has state funding opportunities through the Water Quality Improvement Fund (WQIF),
Agricultural Best

Management Practices Cost Share program and the Land Conservation Fund, among others.

It is important that funding for land conservation, pollution prevention, water quality enhancement, and environmental education be consistent over the long term. Because Federal grants often require matching funds, reducing the amount of state funds for natural resource and environmental enhancement also undermines the ability of the Commonwealth to obtain Federal funding.

Virginia’s Income Tax Programs

State income tax provisions can offer incentives to landowners to engage in conservation efforts that could tie into larger strategic initiatives. Virginia is following the lead of other states in looking at opportunities for encouraging sustainable practices and donations of conservation easements. Like most states, Virginia recognizes charitable deductions against state income taxes for donations of permanent conservation easements; such donations also qualify for deductions on the Federal income tax return. Virginia also recently added a tax credit to increase the incentive for such donations. Beginning in 2000, Virginia allows an individual or corporate taxpayer to claim an income tax credit of 50 percent of the fair market value of any land or interest in land in Virginia unconditionally donated to a public or private conservation agency or a charitable organization “for the purpose of agricultural and forestal use, open space, natural resource, and/or biodiversity conservation, or land, agricultural, watershed and/or historic preservation.” The 2006 General Assembly modified this incentive to only 40 percent which could detract from the program’s popularity. A unique aspect of Virginia’s program is that the tax credits are transferable, allowing the program to be as effective in areas with high land prices as areas with lower land prices. In addition, Virginia enacted a new law in 2000 establishing an income tax credit for owners of forest land who harvest their land but forego timber harvesting along rivers and streams.



Strategies

4-1. Coordinate Agency Efforts to Identify Funding Sources

The Commonwealth's state agencies and their conservation partners should coordinate efforts and programs, to identify future resource needs, and to direct Federal, state, and local funding to the targeted priorities.



4-2. Seek Opportunities to Build Partnerships with Federal Agencies

The Commonwealth's state agencies and their conservation partners should look for opportunities to build partnerships with Federal agencies to further the state's riparian buffer initiatives.

4-3. Identify Existing Sources of Funding

Existing sources of funding should be identified and catalogued to ensure that funds are being spent according to priorities within the Commonwealth.

4-4. Utilize the General Assembly to Establish a Dedicated Source of Funding

The General Assembly should establish a dedicated source of funding (e.g., a real estate transfer tax, garbage

tipping fee, surcharge on water utility bills, etc.) so financing riparian protection can continue.

4-5. Establish Financial Incentives for Citizens

Financial incentives should be provided for citizens to support conservation initiatives. Current incentive Programs such as CREP, the state tax credit program, and the option to dedicate a portion of the license renewal fee to land conservation should be continued.

➤ The continued funding of CREP in the reauthorization of the 2007 Farm Bill is essential. This program now applies only to qualifying agricultural lands; some expansion to other lands should be considered, though administration through the U.S. Department of Agriculture's NRCS may not be appropriate. Enhanced incentives for CREP were presented in spring 2006 and should be continued and revised as needed. Contracts for CREP are for a 10- or 15-year-period and there needs to be funds dedicated to renewing these contracts.

➤ The Federal Environmental Quality Incentive Program (EQIP). This can provide some riparian buffer cost-share funding, though not the rental payments that CREP does. This can include land where CREP does not apply.

4-6. Develop an Urban Riparian Restoration Program

A majority of the success that has been realized has been through farmer's participation in incentive programs. While the majority of lands still are in the large landowner farm/forestal uses, increasingly the conservation message needs to reach the suburban landowner.



4-7. Streamline Conservation Easement Process for Landowners

The donation of riparian conservation easements can often be cumbersome with regards to land appraisal, surveying, lawyer fees and documentation. While the process demands these activities to ensure there are no abuses of the program, it needs to be streamlined to reduce the impediments to landowners donating conservation easements.

4-8. Quantify the Value of Buffers for Planning Purposes

Enumerate the value of, or the ecosystem services provided by, buffers so that localities can evaluate this “green infrastructure” as it contemplates land use and economic development, planning decisions.

4-9. Establish Partnerships Among Localities to Pursue Financial Support

Establish partnerships among localities and stakeholders to more effectively pursue financial investments in forested riparian buffers by the state, public, private and non-profit sectors.

4-10. Implement Cooperative Agreements for Localities to Raise Funds and Obtain Grants

Develop and implement a cooperative agreement among localities that will allow the region to more quickly raise funds to leverage grant opportunities.

4-11. Prioritize Spending on Projects

Prioritize spending on the most beneficial riparian projects.

4-12. Implement Reduced Compensation in Cost-Share BMP Program for Narrower Buffers

Allow for reduced compensation in the cost-share BMP program for narrower buffers.

Objective 5 – Promote Education and Outreach

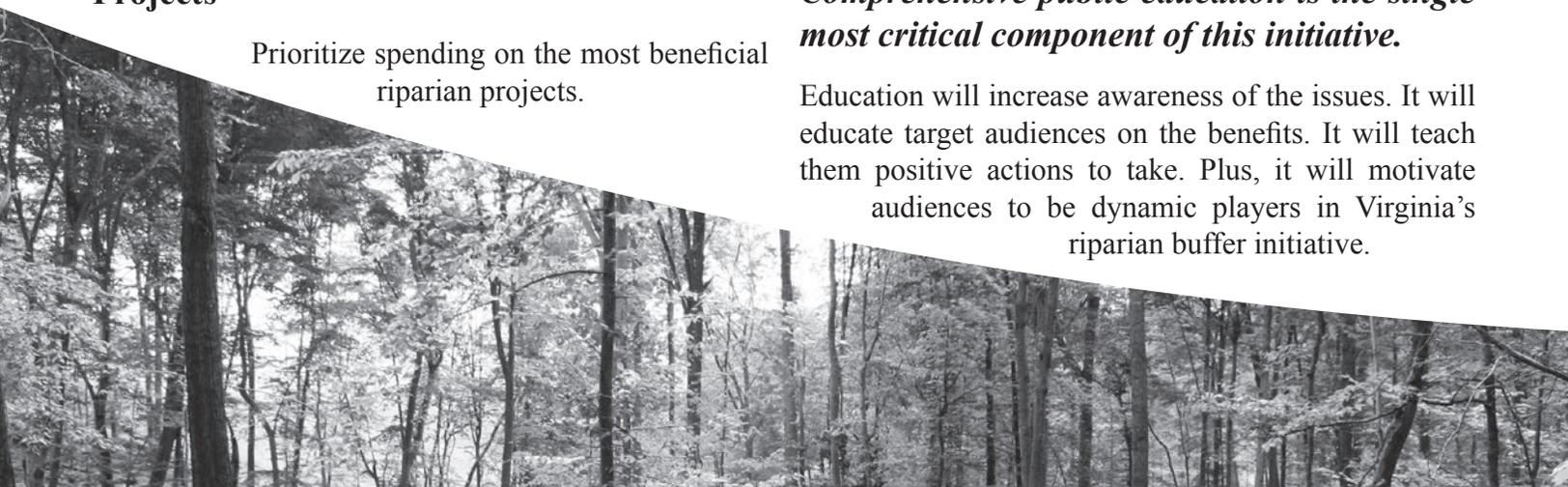
Encourage Bay signatories to implement education and outreach programs about the benefits of riparian buffers and other stream protection measures.

This initiative identifies strategies, programs and partners to educate the public about riparian buffer benefits and encourage active support.



Comprehensive public education is the single most critical component of this initiative.

Education will increase awareness of the issues. It will educate target audiences on the benefits. It will teach them positive actions to take. Plus, it will motivate audiences to be dynamic players in Virginia’s riparian buffer initiative.



Many riparian buffer projects have been installed with little or no cost sharing. This occurs because landowners restore streamside forests to be good natural resource stewards. They have learned about riparian buffer values and benefits from Federal or state agencies, or private non-profit conservation groups. At the same time, the value of outreach is difficult to measure and more challenging to accomplish in the wake of government fiscal austerity. Significant out-reach must occur to meet Virginia's 3,200-mile pledge of new riparian forest buffers.

This vital endeavor will require funding to conduct a comprehensive public education campaign. The monies can be provided to one or more state agencies to increase involvement or to contract a private public relations firm.

If riparian buffer initiatives are to succeed, citizen awareness and involvement programs will need to be expanded to reach more citizens and a diverse constituency. Success will depend, in part, on citizens viewing the effort as a local, grassroots effort to improve their quality of life, not a mandate of the state government. This will require the Commonwealth to engage the planning district commissions, local governments, Soil and Water Conservation Districts, and nonprofit organizations in a way that empowers the local citizenry to make decisions and make progress toward local goals.

Existing Endeavors

Forestry for the Bay

Forestry for the Bay is a voluntary landowner program created as a cooperative effort of the USDA Forest Service, state forestry departments and the Chesapeake Bay Program. It is intended to raise awareness about the value of forests as they relate to water quality. Forest management practices that maintain or improve forest health and structure are encouraged to restore the health of the Chesapeake Bay. The program serves as an introduction or "on-ramp" to other forestry programs. All private, public and commercial landowners in the Bay watershed are eligible, including those who want to restore forests to un-forested

areas. There is an emphasis on those landowners with 10 acres or less. The message is:

- Healthy forests make a healthy Bay
- Managed forests make healthy forests

The intended outcomes of the Forestry for the Bay Program are to:

- Increase forest land
- Increase managed forests
- Increase landowners who develop and follow forestry plan
- Generate new participants for existing programs – Tree Farm, Backyard Foresters, state/Federal stewardship programs
- Enhance access to easements and other incentives to protect forest land
- Achieve higher visibility for forestry practices
- Secure greater public awareness of forestry as a solution to nonpoint source pollution

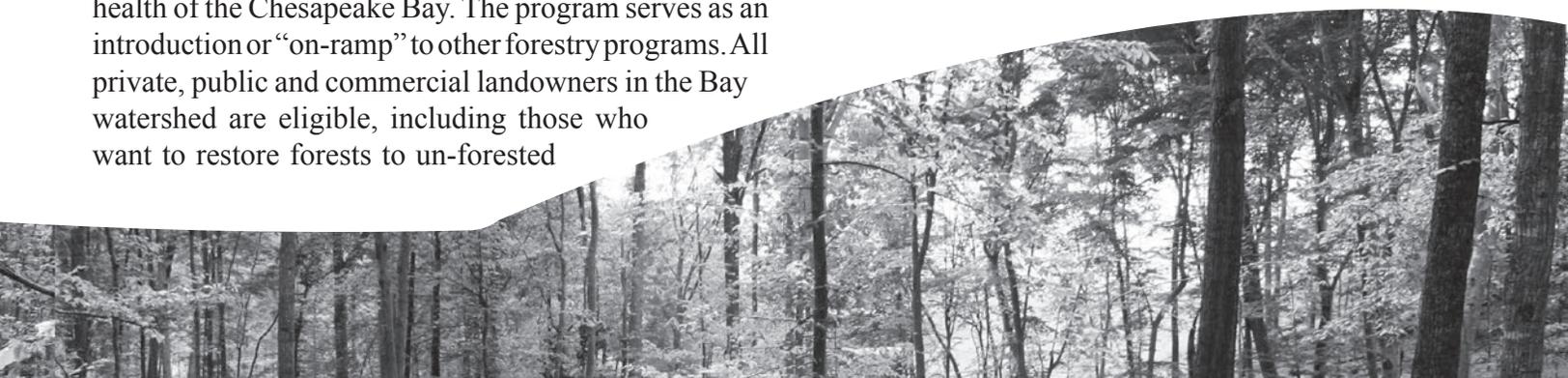
Strategies

5-1. Proactively Expand Citizen Awareness and Engagement

The Commonwealth's state agencies and their conservation partners should take proactive steps to ensure stakeholder input, boost public awareness, and expand citizen engagement in this riparian buffer initiative.

5-2. Actively Sell Riparian Forest and Buffers

The Commonwealth's state agencies and their conservation partners should actively "sell" riparian forest and other buffers by linking it to Virginia's critical conservation needs.



5-3. Utilize Conferences, Workshops and Public Forums to Educate Citizens

The Commonwealth's state agencies and their conservation partners should take advantage of conferences, workshops, and other forums to get the word out about the importance of riparian buffers.

5-4. Educate and Train Conservation Leaders and Decision Makers

The Commonwealth's state agencies and their conservation partners should educate and train conservation leaders, elected officials, and the staff of local, regional, and state agencies and conservation organizations about riparian buffers.

5-5. Develop and Implement a Communication Plan

The Commonwealth's state agencies and their conservation partners should develop a communication plan to encourage riparian buffer establishment and preservation and incorporate these principles and practices in land use and land development actions.

5-6. Educate Residents Regarding the Implications of Land-Use Decisions

Help residents understand the implications of their land use decisions.

Objective 6 – Target, Track and Conduct Research

Increase the level of scientific and technical knowledge or the function and management of riparian forest and other buffers, as well as their economic, social, ecological, and water quality values.

This initiative develops targeting and tracking strategies and efforts

to support riparian buffer conservation and restoration.

As Virginia implements the Riparian Buffer Initiative, it is essential that efforts be targeted where the greatest water quality and living resource benefits can be achieved and the progress towards the buffer mileage goal and the general conservation goal pertaining to riparian buffers be tracked.

The success thus far in working with landowners in reestablishing riparian buffers has relied primarily on voluntary participation through cost sharing for tree planting and fencing. Delivery of the message has relied on mass marketing with relatively little targeting.

Strategies

6-1. Refine Targeting System

Further refine a targeting system utilizing GIS to identify areas with the greatest priority for conservation.

6-2. Develop Program for Easement Acquisition in High Ecosystem Benefits Areas

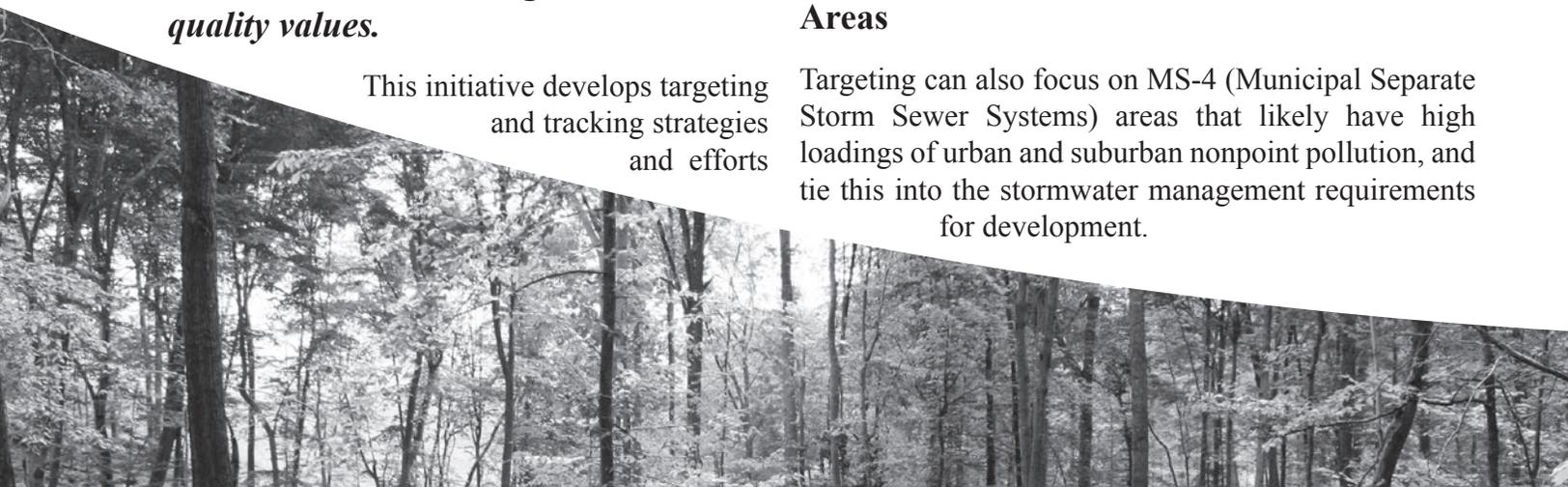
Develop a program for easement acquisition in areas with high ecosystem service benefits.

6-3. Develop Site-Specific Criteria to Ensure Greatest Benefits

Site-specific criteria that would ensure that the greatest benefits are realized from buffer plantings should focus on factors such as proximity to water, steep slopes, nutrient loadings, erodible soils, drinking water supplies, areas with low forest cover, low percentage of streams buffered, aquatic habitat, fish passage projects, trout streams, and shoreline stabilization.

6-4. Ensure Targeting also Includes MS-4 Areas

Targeting can also focus on MS-4 (Municipal Separate Storm Sewer Systems) areas that likely have high loadings of urban and suburban nonpoint pollution, and tie this into the stormwater management requirements for development.



6-5. Utilize a Targeting Map for Ecological Improvement Through Land and Buffer Conservation

To attain the Governor's goal of land conservation, use a targeting map for ecological improvement through land and riparian buffer conservation.

6-6. Concentrate Efforts on Small Headwater Streams for Buffer Effectiveness

Concentrate efforts on small headwater streams for buffer effectiveness. A common idea of a typical riparian buffer is along the mainstem of larger rivers, yet the runoff waters that feed our small headwater streams may be considered more significant and buffers may be more effective here.

6-7. Consider Use of USDA's National Agroforestry Center Planning Framework to Facilitate Planning

Consider utilizing the USDA's National Agroforestry Center planning framework to facilitate planning and designing conservation buffers for multiple objectives. In this framework, regional and landscape-scale public issues are addressed along with site-scale landowner objectives to facilitate balanced management plans providing broad mutual benefits. The framework provides general guidance for inventory and analysis, preparation of planning objectives, and development and evaluation of management options. To support the planning framework, planning tools and data are being developed to assist stakeholders in creating riparian management plans. The key to this riparian buffer plan is to systematically identify all riparian areas of conservation value within

the area of focus, to assess them for their relative ecological values and contributions to the function of the system as a whole, and to use this information to establish conservation and restoration priorities.



6-8. Utilize the Virginia Conservation Lands Needs Assessment

Utilize the Virginia Conservation Lands Needs Assessment (VCLNA) for statewide targeting communities

There are a number of potential uses for the VCLNA:

- To direct land protection and acquisition for conservation, historic and cultural resources, and recreation;
- To prioritize other resource management actions, such as invasive species control;
- To identify priority potential restoration sites, and



- To facilitate planning by local governments.
- Utilize the green infrastructure planning process to implement the riparian forest and other buffer initiatives. This approach refers to an interconnected green space network (including natural areas and features, public and private conservation lands, working lands with conservation values, and other protected open spaces) that is planned and managed for the natural resource values it provides and for the associated benefits it confers to human populations. Green infrastructure is different from conventional approaches to conservation because it looks at conservation values and actions in concert with land development and growth management. Other conservation approaches typically are undertaken in isolation from—or even in opposition to—development. In addition, green infrastructure employs planning, design and implementation approaches similar to those used for roads, water management systems, and other community support facilities.

The green infrastructure approach can provide Virginia with a framework for riparian buffer protection and growth while promoting smart growth and smart development. Virginia’s working lands, wetlands, riparian areas, wildlife habitat, and other open spaces are critical resources that provide for abundant wildlife; an attractive and healthy environment; adequate, high-quality water supplies, and recreational opportunities.

Taking a more comprehensive, proactive approach to conservation provides a number of immediate benefits to communities:

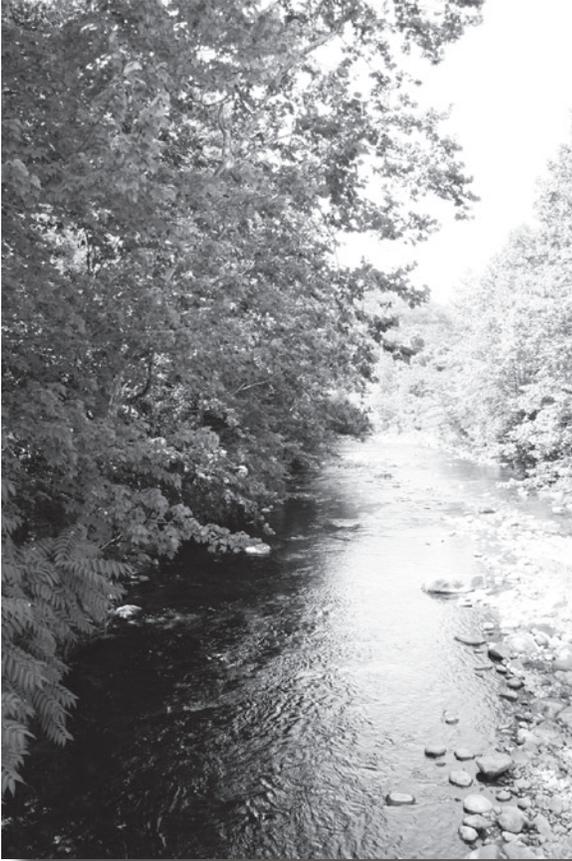
- Protects and maintains the values and functions of natural ecosystems;
- Sustains working landscapes;
- Reduces opposition to development;
- Provides predictability and certainty, and
- Reduces costs for built infrastructure.

The Green infrastructure approach can provide Virginia with a strategic framework for land protection and land use; a framework that will sustain natural ecosystem values and functions and integrate the needs of fish, wildlife, and human communities, and enable agencies and organizations to work together to guide future growth.

Traditional land conservation and green infrastructure planning both focus on environmental restoration and preservation, but green infrastructure also concentrates on the pace, shape, and location of development and its relationship to important natural resources and amenities. Unlike more conventional conservation approaches, green infrastructure strategies actively seek to plan land use and land conservation together in a way that is consistent with natural environmental patterns. In doing this, it provides a framework bringing together diverse public, private, and nonprofit stakeholders in strategic conservation.



Barriers to Implementation



Barriers To The Implementation of Virginia Chesapeake Bay 2010 Riparian Buffer Goals

For all Bay signatory partners, there are common barriers to the implementation of the riparian buffer initiative in the Chesapeake Bay watershed. Stakeholder meetings in Virginia in 2002 resulted in a list of many barriers to riparian buffer goal attainment by 2010. The barriers can be grouped into three basic areas:

1. Technical Assistance Crisis
2. The need for new incentives and approaches
3. A lack of baseline knowledge regarding riparian forest conservation

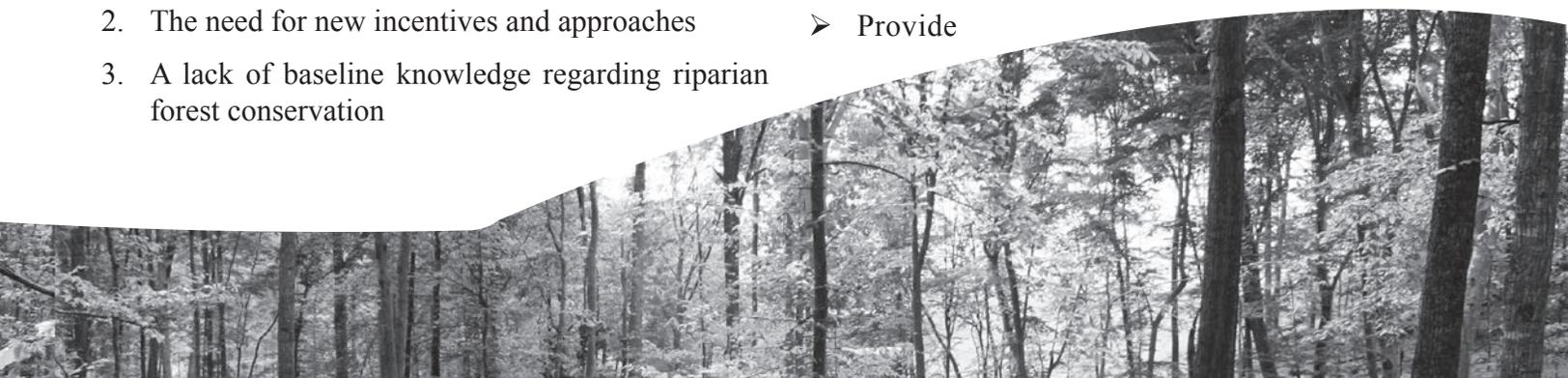
The following graphs show historical gains and future needs to reach the 2010 Chesapeake Bay riparian goal for Virginia.

Barrier 1. Technical Assistance Crisis

To achieve the Virginia goal of 3,200 miles of riparian forest buffers by the year 2010, 764 more buffer miles need to be planted. With the current number of technical service providers, this task is daunting. The additional miles needed require additional personnel and funding commitments. Technical service providers are the connection between the landowner and the implementation of projects. The first step is to reach landowners, the second step is developing forest buffer planting plans and present contracts for the installation of the projects. Up to this point, the agencies have not been able to sustain the needed level of landowner attention and product delivery that will lead to accomplishing the Virginia commitment to the 2010 Chesapeake Bay riparian buffer goal.

Strategies to Reduce Barrier 1

- Provide professional training opportunities for new technical service providers including consultants, and non-profit organizations.
- Institute higher FTE levels in appropriate agencies.
- Involve decision makers in training opportunities to create awareness of field needs.
- Link riparian forest buffers with other appropriate training opportunities (wetland studies, wildlife habitat development, and stream restoration).
- Sponsor technical exchange workshops for technical service providers.
- Provide



incentives to motivate technical service providers, and attract more technical service providers.

- Encourage agencies to budget for riparian buffer training.
- Foster agency partnerships to maximize resources and personnel for the establishment of riparian forest buffers.
- Reward technical service provided for work well done, through recognition or monetary means.

Barrier 2. Need For New Incentives and Approaches For The Establishment Of Riparian Forest Buffers

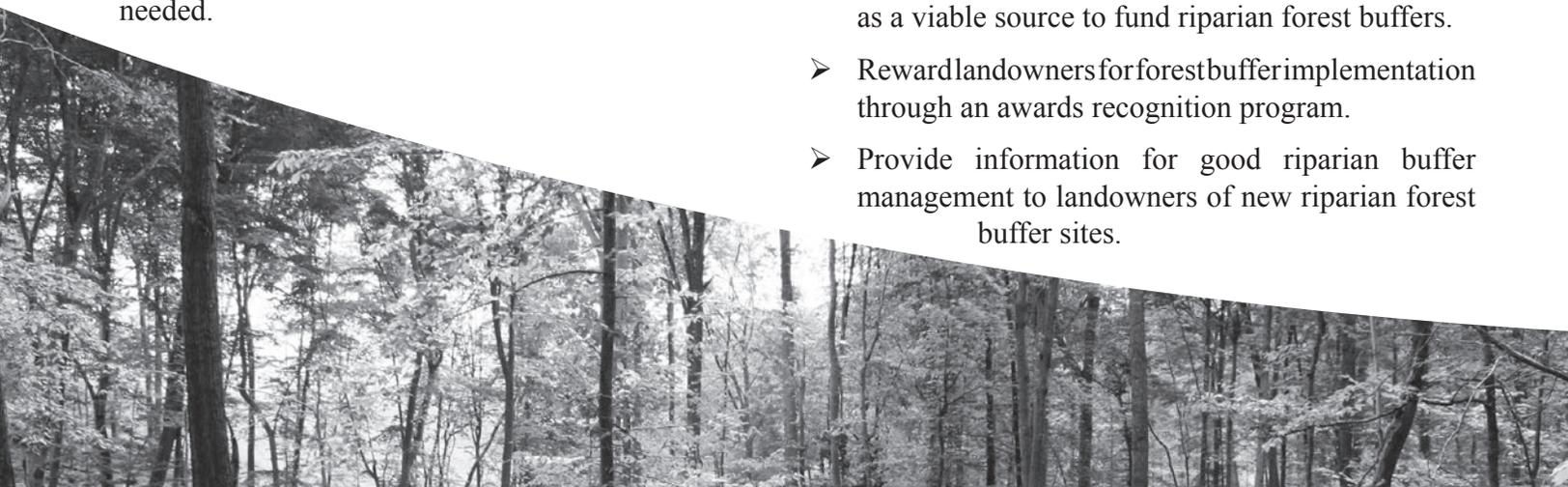
Earlier riparian forest buffer achievements had considerable momentum because of the Conservation Reserve Enhancement Program (CREP) introduced in 2000. Early funding schedules were attractive and landowners were eager to enroll. Currently, the return to the landowner is about 75 percent of the cost for establishing riparian buffers versus the 100 percent offered earlier. Many conservation groups require conservation easements in return for assistance with riparian buffer establishment. In addition, not all landowners qualify for CREP or similar cost-share programs. Some landowners do not want to be part of government programs. A landowner survey in the Bay watershed relates landowner dissatisfaction with the appearance of existing CREP sites. It becomes obvious that CREP will not be the total answer to meeting the 2010 riparian buffer goal. New incentives and approaches will be needed.



Strategies to Reduce Barrier 2

- Encourage voluntary planting of riparian buffers by using ecological service values as a base for returning investments to landowners. Power plants, water treatment facilities, and other point source industries pay into a fund used to reimburse planting or retaining riparian forest buffers as a stewardship action.
- Support non-profit organizations providing free technical service and materials for riparian forest buffer plantings.
- Involve corporate sponsors to support riparian forest buffer establishment.

- Develop outreach messages that refocus the riparian buffer water quality message toward a message that includes the many other benefits of riparian forest buffers.
- Continue to find ways to employ nutrient trading as a viable source to fund riparian forest buffers.
- Reward landowners for forest buffer implementation through an awards recognition program.
- Provide information for good riparian buffer management to landowners of new riparian forest buffer sites.



- Use the newly developed Landowner Information Packet to encourage riparian buffer establishment and management.
- Tie stream restoration mitigation efforts to increased riparian forest and other buffer establishment.
- Reward outstanding scientists and institutions making gains in the realm of forest buffer ecology.
- Develop an outreach message that focuses on the economics of conservation versus restoration.

Barrier 3. A Lack of Baseline Knowledge Regarding Riparian Forest Conservation

Currently there are more than 800 scientific papers available related to riparian buffers. The focus ranges from the influence of forest buffers on the health of streams, to the nutrient removal activity of micro-organisms in forest buffer soils. One aspect that has not been tackled is the value of forest buffer conservation and the relationship it has to the Chesapeake Bay watershed. Keeping forest buffers in place does have known values.

Storm water management technology has been developed to mimic forest cover making the economic case to retain forest buffers difficult to establish. The key to valuing forest buffer conservation is associated with values beyond pollution reduction. Economic values for additional forest buffer ecological services need to be established and applied to forest buffer conservation.

Strategies To Reduce Barrier 3.

- Partner with academic institutions to focus research where it is needed.
- Ensure that all agencies have riparian forest buffer conservation language in their project and land management guidelines.
- Support local government ordinances and enforcement measures that protect and conserve riparian forest buffers.
- Target shorelines with riparian forest buffers for protection from future encroachment or removal.
- Through outreach encourage the scientific community to focus research on riparian forest buffer economic values.

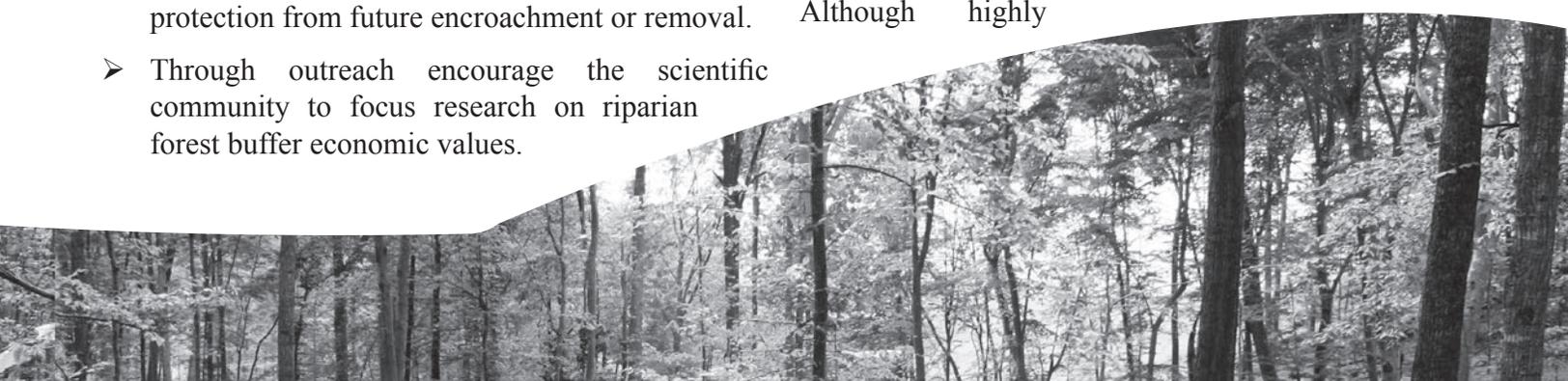
The Technical Assistance Crisis

The single biggest limitation to voluntary restoration of riparian forest buffers on private lands is the ability to provide effective outreach and technical guidance to farmers and local groups willing to plant and maintain riparian forests. Agencies charged with implementing this program need to intensify this assistance to address the substantially expanded scale of restoration contemplated by the Tributary Strategies, but regrettably, the number of these personnel is declining due to budget issues. Additional public-private partnerships can help but the number of field foresters and biologists assisting landowners in buffer restoration must be expanded. Technical services are provided primarily by state and Federal agencies.

There is inherent complexity and demands with the voluntary approach. Landowner turnover also complicates technical assistance needs. The average length of land ownership for a parcel is around 15 years, resulting in a constant need to inform new landowners of appropriate practices and assist with stewardship. Ownership parcel size is also trending smaller, meaning that more landowners must be reached to achieve the same level of progress. Funds are needed for outreach to develop restoration partnerships with non-profit groups, local governments, and other public and private entities.

CREP will not do it all

To date, riparian buffer stakeholders have relied on the USDA's Conservation Reserve Enhancement Program as the primary engine for buffer establishment. Although highly



effective thus far, the CREP Program has limitations. CREP provides generous landowner incentives and is costly. Presently, incentive payments for grass buffers are only 25 percent-30 percent less than for forests; yet forest buffers require a long-term commitment of land, are significantly more effective at nutrient removal, accomplish multiple goals, and are more costly to establish.

CREP will also expire unless reauthorized in the 2007 Farm Bill and, in the interim, current state programs do not authorize acreage sufficient to meet the Bay or Tributary Strategy goals at current levels of implementation. Although not the only tool, CREP must be continued, further optimized to promote forest buffers, and even expanded if CBP goals are to be met.

Targeting of New Incentives/ New Approaches

Technical assistance must be increased, but may also have to come in untraditional ways. Partnerships with non-profits offer promise. While forest buffers programs that serve agricultural landowners must continue, other incentives and cost-share programs must be developed to restore buffers on non-agricultural land, such as in urban/suburban and shoreline settings. Voluntary approaches must be customized to better target effective practices, such as forest buffers as well as landscapes where they will be most effective in nutrient control. In the end, incentives alone may not be sufficient to meet these challenges.

Retention Must Match Restoration

Forests are being lost at a rate of more than 100 acres/day. The rate of loss of riparian forests is currently unknown.

The Chesapeake Bay's Keystone Commitment to "conserve existing riparian forests along all streams and shorelines"

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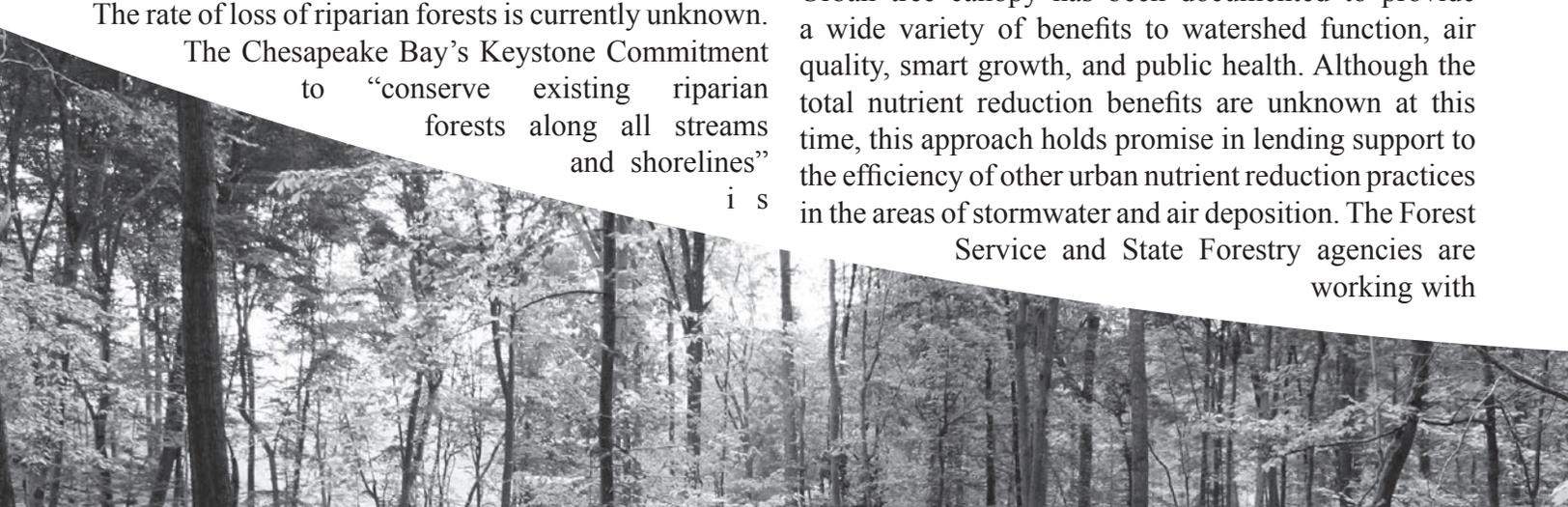
interpreted as a net gain but not a prohibition of loss. The long-term goal of 70 percent of all streambanks and shorelines points to the need for stronger protections. In the long run, local government commitments to prevent clearing of, or require mitigation for, clearing riparian forests during development, stormwater management, or transportation system construction will be essential. Losses to development subtract from overall progress. Keeping existing mature buffers is a sensible strategy, one that is starting to be tracked by extent of riparian forest buffers placed in conservation status.

Reduce the Costs of Tree Planting and Maintenance

Planting trees is the quickest way to establish forest buffers, giving control over species choice and ability to suppress the spread of invasive and exotic plants. However, ensuring the survival of planted forests on agricultural and urban sites where pests and threats to survival are persistent can be difficult. In many areas of the watershed, forests were the historic cover, and streambanks will reforest naturally over time if not disturbed, albeit slowly. Field studies are needed to improve natural regeneration and planted forests through additional experimentation with a variety of planting materials, tree protection, and other techniques to help reduce costs and increase survival. Some of these programs might be developed as corporate, public-private partnerships.

Expanding Urban Tree Canopy and Forest Land Use

This is a new focus of the 2003 Directive 03-01 and represents a new arena of financial and public support. Urban tree canopy has been documented to provide a wide variety of benefits to watershed function, air quality, smart growth, and public health. Although the total nutrient reduction benefits are unknown at this time, this approach holds promise in lending support to the efficiency of other urban nutrient reduction practices in the areas of stormwater and air deposition. The Forest Service and State Forestry agencies are working with



cities in the Bay watershed to establish demonstrations of this approach and document their benefits. Studies of nitrogen deposition in the watershed suggest that

forest lands can sequester 80 percent-90 percent of atmospherically deposited nitrogen, in sharp contrast with other land uses.



APPENDIX

Web Resources

Secretary of Natural Resources

Tributary Strategies

<http://www.naturalresources.virginia.gov/Initiatives/TributaryStrategies/index.cfm>

Virginia Department of Forestry

<http://www.dof.virginia.gov>

Riparian Forest Buffers

<http://www.dof.virginia.gov/rfb/index.shtml>

Water Quality

<http://www.dof.virginia.gov/wq/index.shtml>

Forestry Best Management Practices

<http://www.dof.virginia.gov/wq/index-bmp-fguide.shtml>

Chesapeake Bay Program

<http://www.chesapeakebay.net>

Chesapeake 2000 Agreement

<http://www.chesapeakebay.net/c2k.htm>

Water Quality

<http://www.chesapeakebay.net/wquality.htm>

Nutrient Pollution

<http://www.chesapeakebay.net/nutr1.htm>

Tributary Strategies

<http://www.chesapeakebay.net/wqtributarytech.htm>

Tributary Strategy Tools

<http://www.chesapeakebay.net/tribtools.htm>

State of the Chesapeake Bay Report

<http://www.chesapeakebay.net/pubs/sob/>

Forestry Workgroup

<http://www.chesapeakebay.net/fwg.htm>

Riparian Forest Buffers

<http://www.chesapeakebay.net/forestbuff.htm>

Expanded Riparian Forest Buffer Goals

http://www.chesapeakebay.net/info/pressreleases/ec2003/rip_forest_buffer_directive.pdf

Virginia Department of Conservation and Recreation

DCR's Soil and Water Conservation Programs

<http://www.dcr.state.va.us/sw/>

DCR and the Chesapeake Bay Watershed

<http://www.dcr.state.va.us/sw/bayshed.htm>

Nonpoint Source Pollution

<http://www.dcr.state.va.us/sw/nps.htm>

Agricultural Incentives Programs

<http://www.dcr.state.va.us/sw/costshar.htm>

Virginia's Conservation Reserve Enhancement Program

<http://www.dcr.state.va.us/sw/crep.htm>

Virginia's Soil and Water Conservation Districts

<http://www.dcr.state.va.us/sw/swcds.htm>

Virginia Department of Environmental Quality

DEQ and the Bay

<http://www.deq.state.va.us/bay/>

DEQ's Water Programs

<http://www.deq.state.va.us/water>

Virginia Cooperative Extension

<http://www.ext.vt.edu/>

Understanding the Science Behind Riparian Forest Buffers: An Overview

<http://www.ext.vt.edu/pubs/forestry/420-150/420-150.html>

Virginia Natural Resources Conservation Service

<http://www.va.nrcs.usda.gov>

Virginia Riparian Forest Buffer Panel Members

Canaan Valley Institute
 Chesapeake Bay Commission
 Chesapeake Bay Foundation
 Chesapeake Bay Program
 U.S. Geological Service
 U.S.D.A. Natural Resources Conservation Service
 Virginia Association of Soil and Water Conservation Districts
 Virginia Department of Agriculture and Consumer Services

Virginia Department of Conservation and Recreation
 Virginia Department of Environmental Quality
 Virginia Department of Forestry
 Virginia Department of Game and Inland Fisheries
 Virginia Department of Transportation
 Virginia Institute of Marine Science
 Virginia Tech School of Forestry and Wildlife

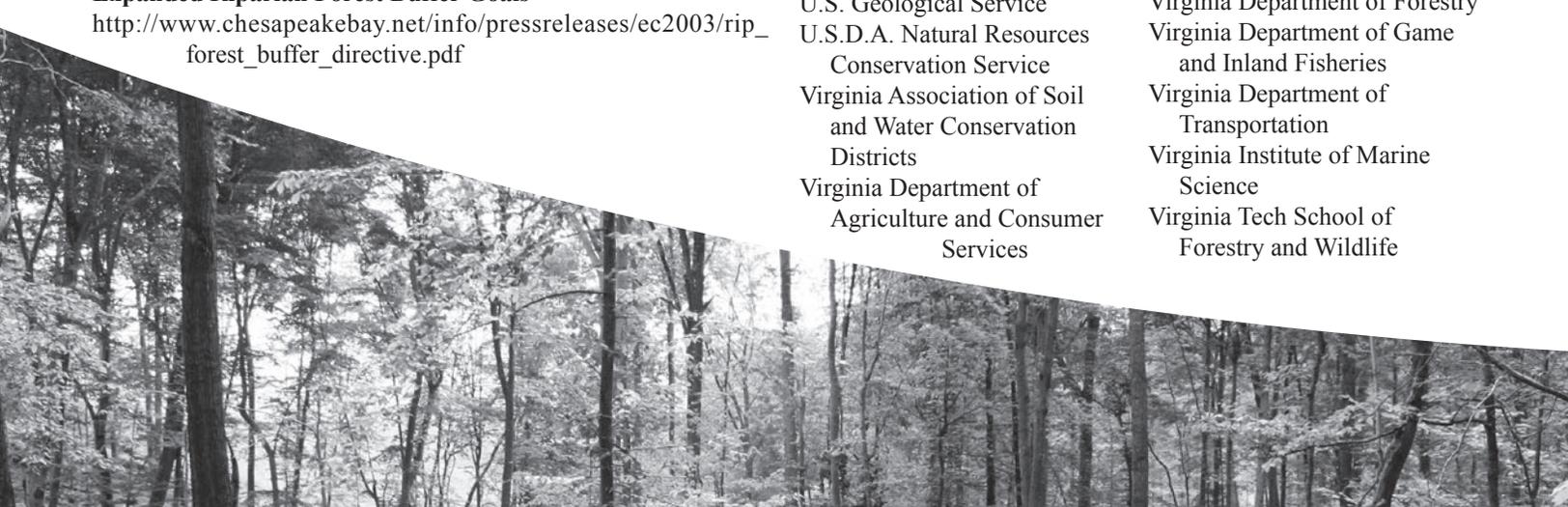
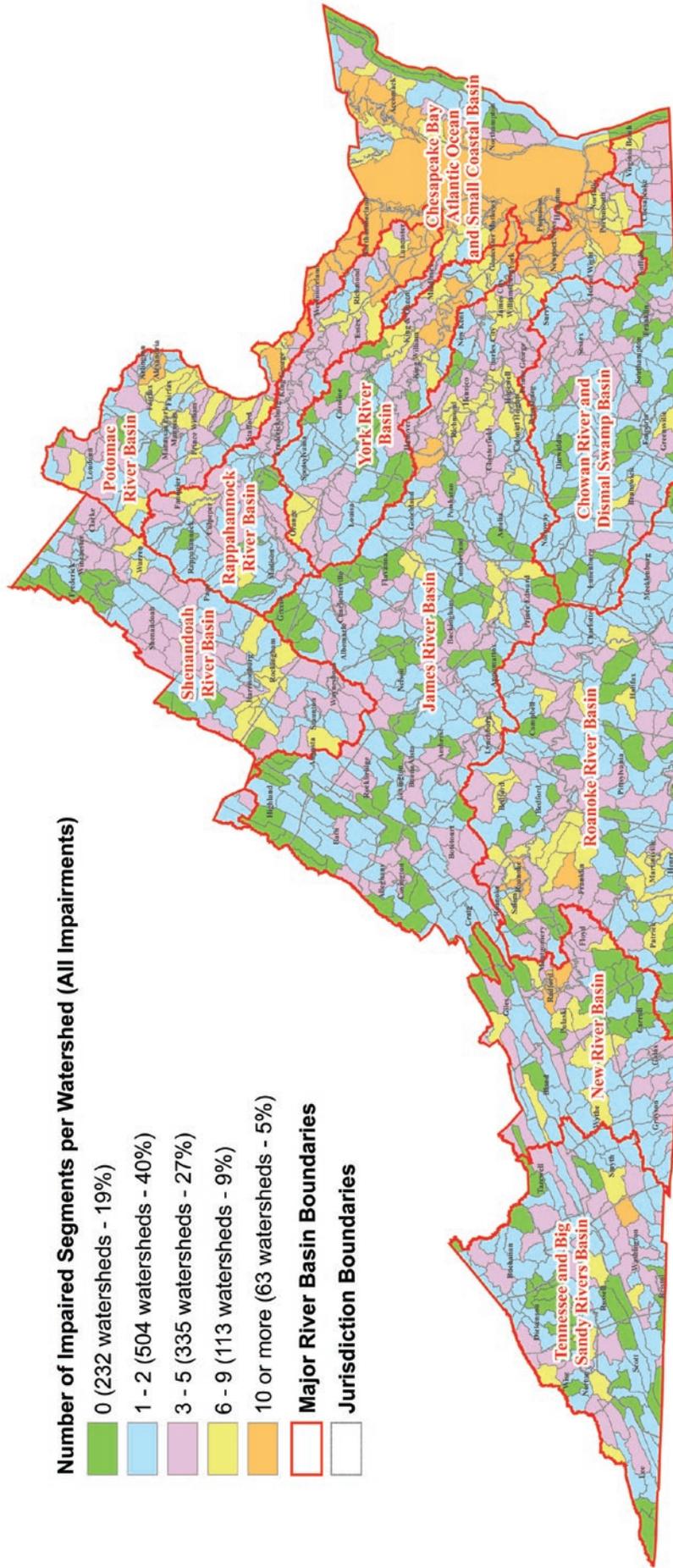


Figure 4

Distribution of Impaired* Waters In Virginia's Watersheds

Number of Impaired Segments per Watershed (All Impairments)

- 0 (232 watersheds - 19%)
- 1 - 2 (504 watersheds - 40%)
- 3 - 5 (335 watersheds - 27%)
- 6 - 9 (113 watersheds - 9%)
- 10 or more (63 watersheds - 5%)
- Major River Basin Boundaries
- Jurisdiction Boundaries



* Excludes Category 4B Waters

Sources: Virginia Department of Environmental Quality, 2006 Water Quality Assessment
Virginia Department of Conservation and Recreation



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