CHESAPEAKE BAY FOUNDATION

Saving a National Treasure

The Importance of Streamside Forests for Pennsylvania's Most Sensitive and Pristine Streams

Comments of Harry Campbell
Pennsylvania Executive Director, Chesapeake Bay Foundation
to the Pennsylvania House Environmental Resources & Energy Committee

January 29, 2014

Chairman Miller, Chairman Vitali, and other distinguished members of the House Environmental Resources and Energy, my name is Harry Campbell, and I am the Executive Director of the Pennsylvania Office of the Chesapeake Bay Foundation (CBF). I would like to thank you for the opportunity to discuss the ecological importance of streamside forests (forested riparian buffers) for Pennsylvania's most sensitive and pristine streams.

CBF is the largest non-profit organization dedicated to the protection and restoration of the Chesapeake Bay, its tributaries, and its resources. With the support of over 200,000 members, our staff of scientists, attorneys, educators, and policy experts work to ensure that policy, regulation, and legislation are protective of the quality of the Chesapeake Bay and its watershed, the largest tributary of which is the Susquehanna River.

Today, this Committee seeks to discuss House Bill 1565 which would remove the riparian forest buffer requirement for land developments that require erosion and sedimentation control and post-construction storm water permits when occurring alongside Pennsylvania's Special Protection Waters. My comments focus on the importance of forests alongside the Commonwealths streams.

Streamside forests are the natural condition of Pennsylvania streams and are amongst the most cost-effective water quality tools we have. For nearly two decades, Pennsylvania has invested in restoring the forested stream buffers we've lost--preserving what we have is paramount in our efforts to protect Pennsylvania's best streams, restore water quality in degraded streams, and maintain the Chesapeake Bay Clean Water Blueprint.

The Natural State of Pennsylvania's Streams

Prior to the colonization of Pennsylvania, what would become Pennsylvania and its network of meandering rivers and streams, along with the life that lived in them, had adapted to tens of thousands of years of fully forested riparian areas, forested wetlands, and forested uplands. Back then, as recent research indicates, streams often looked different in many ways than they do today.

Streambanks tended to be very low gradient, low lying streams meandered across wide valley floors, water flowed freely over rippling beds of cobble and gravel, and large woody debris and fallen leaves provided habitat and food sources for an abundance of aquatic life. The banks of streams, their floodplains, and their watersheds were forested throughout.

Conceptual cross-section of the historical condition of a valley stream in Pennsylvania prior to colonization.

Source: LandStudies, Inc

Pennsylvania's Special Protection Waters

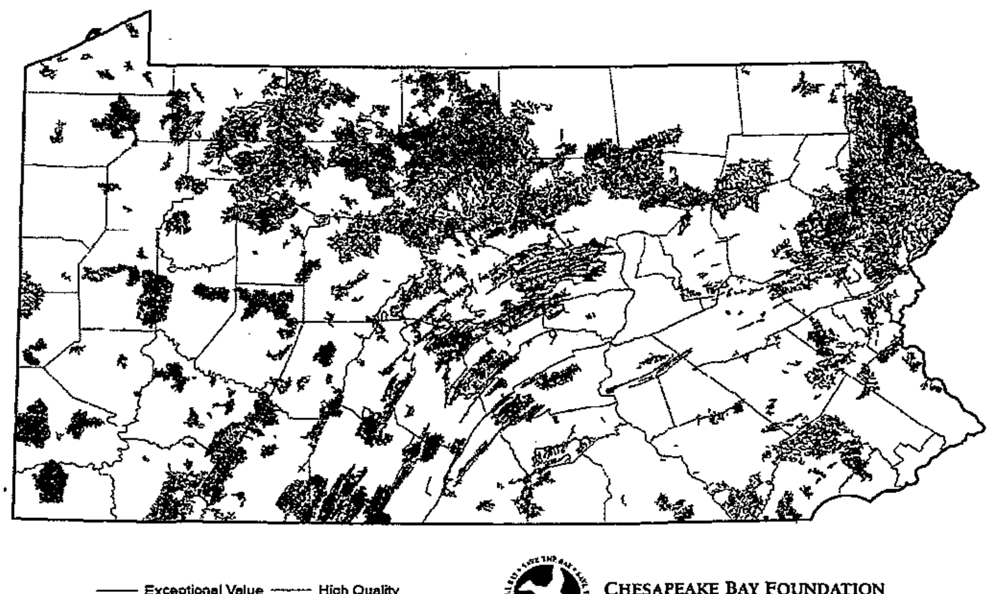
Although all of Pennsylvania's waterways formed in and adapted to forested conditions, today only a relatively small percentage of our streams resemble what they once were. These remnants of the historical streams and their diverse and abundant life and pristine water quality conditions tend to be found today in Pennsylvania's Special Protection Waters.

Pennsylvania's Chapter 93 "Water Quality Standards" are regulations with roots in both the federal Clean Water Act and the Pennsylvania Clean Streams Law. These regulations provide the Pennsylvania Department of Environmental Protection (DEP) with tools to protect, maintain, and restore the water quality of our rivers and streams. The Chapter 93 regulations establish "designated uses" for each water body in Pennsylvania and require the protection of such uses. The rivers and streams with the most outstanding water quality, reflected in both chemistry and aquatic life, are afforded the greatest degree of protection, and are designated either High Quality (HQ) or Exceptional Value (EV). Collectively, these streams are often referred to as Special Protection Waters.

When a stream meets the scientifically rigorous classification of either High Quality or Exceptional Value, it falls under the protection of Pennsylvania's Antidegradation Regulations (25 Pa. Code § 93.4a). These regulations are established by DEP in order to assure that activities that occur alongside special protection streams do not degrade the ecological and water quality conditions of the stream.

Of the roughly 85,000 miles of identified streams in the Commonwealth, only about 3.9 percent are designed as Exceptional Value, and about 27 percent are High Quality.[1] Although such streams are found throughout the Commonwealth, the majority of these streams are concentrated in the northeast, north-central, and northern parts of the state.

Exceptional Value and High Quality Streams of Pennsylvania



Commonwealth of Pennsylvania. 2003. Pennsylvania Code. Title 25 Environmental Protection. Department of Environmental Protection. Chapter 93. Water Quality Standards. Harrisburg, PA

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Importantly, only about 0.8 percent—or a little over 700 miles—of all streams in the Commonwealth are classified as either HQ or EV and are also considered "impaired" by DEP. As noted below, these streams are the only streams requiring restoration of a forested riparian buffer under Pennsylvania's Chapter 102 regulations. [2]

[1] Jackson, J.K. 2009. Understanding Stream Conditions: Lessons from an 11-year study of macroinvetebrates in Easter Pennsylvania's Schuylkill River Watershed, with a focus on Exceptional Value and High Quality Streams. Stroud Water Research Center, Avondale, PA. http://www.stroudcenter.org/research/projects/schuylkill/Schuylkill_Summary.pdf

[2] Pennsylvania Bulletin, Vol. 40, No. 34, August 21, 2010. http://www.pabulletin.com/secure/data/vol40/40-34/40_34_p3.pdf

The Importance of Streamside Forests

A large and robust number of literature reviews of peer-reviewed scientific studies have documented the expansive water quality, ecological, societal, and economic benefits associated with riparian buffers.[3,4,5,6,7,8,9,10,11,12]

Research has continuously indicated that forested buffers provide **significant removal of nonpoint source pollution**, such as nitrogen, sediment, and phosphorus—the leading causes of stream degradation in Pennsylvania and the major pollutants impacting the Chesapeake Bay. While site-specific conditions dictate the effectiveness of such systems, many researchers have concluded that buffers can remove upwards of 80 to 90% of such contaminants when equal or greater to 100 feet in width (see summary table below):

Summary of Select Studies Reporting Percentage of Pollutant Reductions Based on Buffer Size

		Percent Reduction based on Buffer Size											
		~15 ft (4.6 m)			~35 ft (10.7 m)			~100 ft (30.5 m)			>100 ft (>30.5 m)		
Study	Year	N	P	S	N	P	S	N	P	S	N	P	S
Vellidis *et al.*	2003										66%	59%	
Lowrance *et al.*	2001	5%	62%	60%	50%	65%	80%	80%	80%	90%	95%	90%	90%
Lowrance *et al.*	1995	4%	29%	61%	23%	24%	75%	80%	77%	97%			
Schwer & Clausen	1989							76%	78%	89%			
Magette *et al.*	1987	17%	41%	72%	51%	53%	86%						
Barker & Young	1984										99%		
Young *et al.*	1980							87%	88%				

N= total nitrogen; P=total phosphorus; S=total suspended sediments

A 2005 literature review conducted by the U.S. Environmental Protection Agency (USEPA)[9] concluded that based on the over 100 studies reviewed, nitrogen removal from overland surface flows and shallow subsurface groundwater discharges to streams reached peak capacity when the width of the buffer exceeded 328 feet (100 meters). Seventy-five percent removal of nitrogen, however, was found at widths of approximately 92 feet (about 28 meters).

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[3] A. J. Castelle, et.al. 1994. Wetland and Stream Buffer Size Requirements-A Review. Journal of Environmental Quality. J23:878-882.

[4] Correll, D. 1999. Vegetated Stream Riparian Zones: Their Effects on Stream Nutrients, Sediments, and Toxic Substances. An Annotated and Indexed Bibliography of the world literature. Smithsonian Environmental Research Center, Edgewater, MD.

[5] Meyer, J. M. 1999. A Review of the Scientific Literature on Riparian Buffer Width, Extend and Vegetation. Institute of Ecology, The University of Georgia, Athens, GA.

[6] Broadmeadow , S. and T. R. Nisbet. 2004. The effects of riparian forest management on the freshwater environment: a literature review of best management practice. Hydrology and Earth System Sciences Discussions **8**, 3 (2004) 286-305.

[7] Semlitsch' R,, J. Russell Bodie. 2003. Biological Criteria for Buffer Zones around Wetlands and Riparian Habitats for Amphibians and Reptiles. Conservation Biology, Volume 17, Issue 5, pages 1219–1228, October 2003.

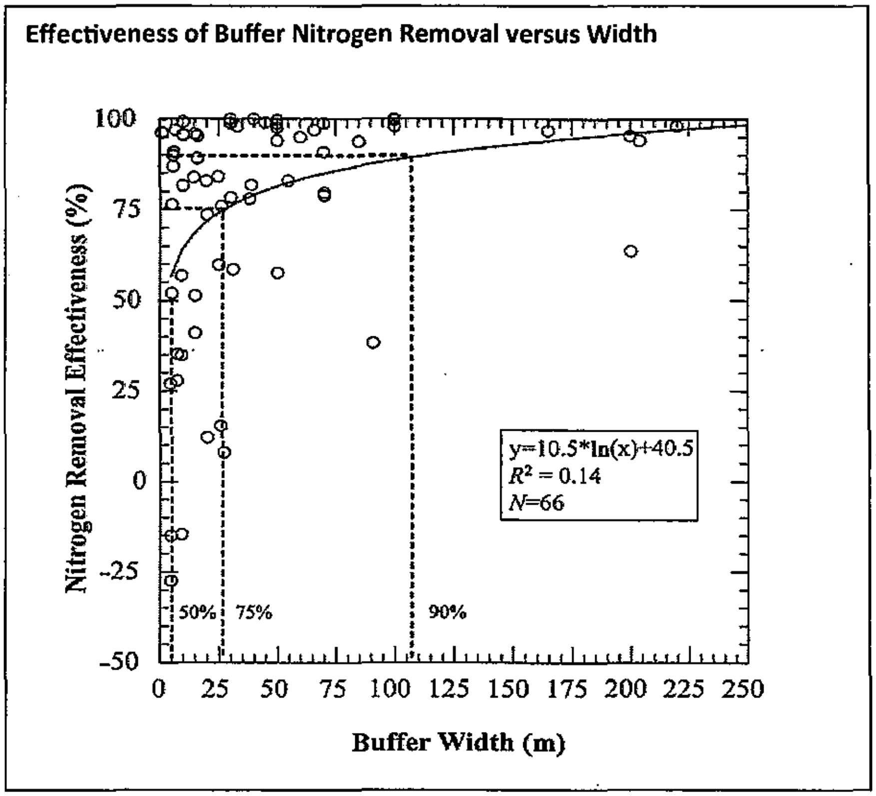
[8] Belt, G.H., J. O'Laughlin, and T. Merrill. 1992. "Design of forest riparian buffer strips for the protection of water quality: analysis of scientific literature" Idaho Forest, Wildlife, and Range Policy Group Report No. 8, University of Idaho, Moscow, ID.

[9] Chow, Leeanne. 2012. A literature review of riparian buffer widths for sediments, nutrients and large woody debris. University of British Columbia, Forestry Undergraduate Essays/Theses, 2011 winter session, FRST 497.

[10] Xuyang Zhang, et.al. 2010. A Review of Vegetated Buffers and a Meta-analysis of Their Mitigation Efficacy in Reducing Nonpoint Source Pollution. Journal of Environmental Quality. 2010. 39:76–84. doi:10.2134/jeq2008.0496.

[11] Mayer, P.M., et.al. 2005. Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of the Current Science and Regulations. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/118, 2005.

[12] Mayer, P.M., et.al. 2007. Meta-Analysis of Nitrogen Removal in Riparian Buffers. Journal of Environmental Quality, 36: 1172–1180.

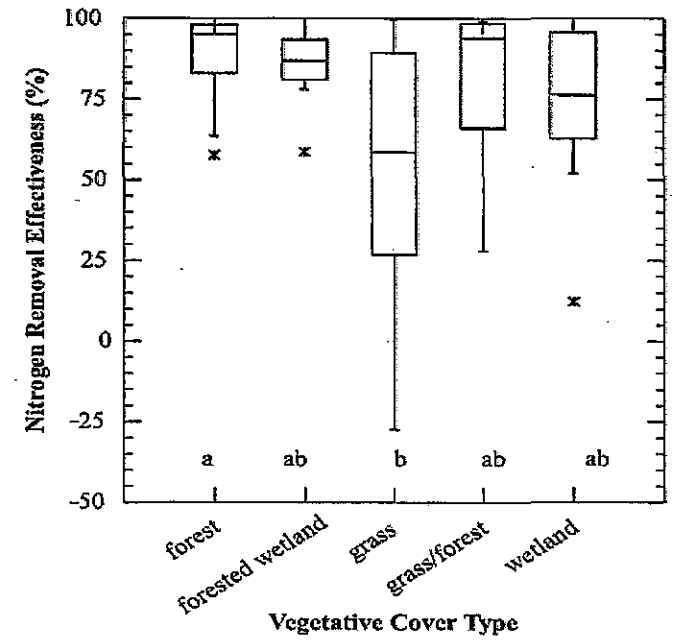


According to the same USEPA review, **forested riparian buffers, when compared to riparian buffers of other vegetation, provided the most effective and consistent removal of nitrogen,** whether it is from overland surface flows or shallow subsurface groundwater discharges to adjacent streams.

In addition to capturing and treating pollution from runoff, research by the Stroud Water Research Center on Pennsylvania streams has concluded that forested buffer systems, compared to grassed systems, provide enhanced *in situ* (in-stream) contaminant sequestration and degradation primarily due to increased biological activity. The researchers noted that increased nitrogen attenuation and pesticide degradation were particularly associated with **forested stream buffers, with these streams attenuating 200 to 800% more than non-forested streams**[13]. The ability of forested buffers to enhance the in-stream processing of both nonpoint and point source pollutants reduces their impact on downstream rivers and estuaries.

[13] Sweeney, B, T.L. Bott, J. K. Jackson, L. A. Kaplan, J. D. Newbold, L. J. Standley, W. C. Hession, and R. J. Horwitz. 2004. Riparian deforestation, stream narrowing, and loss of stream ecosystem services. PNAS, September 2004; 101: 14132–14137

Nitrogen Removal Effectiveness based on Buffer Vegetation Type



The water quality benefits of forested riparian buffers are also well documented; however, what is often not immediately apparent to decision makers is that **buffers offer numerous economical and societal benefits as well.**

Several studies have documented **increased property values** by adding to the natural character and providing viewsheds within the community. In the Pennypack Park area of Philadelphia, the forested stream buffer network was found to increase adjacent property values by an average of 33%, with a net increase of more than $3.3 million in real estate values. Another such system in Boulder, CO, was found to increase property values as well, resulting in an additional $500,000 in increased tax revenue per year.[14] In a national study of ten programs that diverted development away from stream edges, researchers discovered that developed land next to protected floodplains had increased in value by an average of $10,427 per acre.[15]

Another benefit of buffers is the **decreased need for costly stormwater infrastructure**, like underground conveyance (pipes) and land-consuming detention or infiltration basins.[16,17]

[14] Center for Watershed Protection, Better Site Design: A Handbook for Changing Development Rules in Your Community, August, 1998, p. 134. Ellicott City, MD.

[15] Burby, R. 1988. Cities Under Water: A Comparative Evaluation of Ten CitiesÕ Efforts to Manage Floodplain Land Use. Institute of Behavioral Science #6. Boulder, CO. 250 pp.

[16] Matteo, M., et.al. 2006. Watershed-Scale Impacts of Forest Buffers on Water Quality and Runoff in Urbanizing Environment. Journal of Water Resources Planning and Management .(3), 144–152.

[17] Resources for the Future. Webinar: Green Infrastructure: Using Natural Landscapes for Flood Mitigation and Water Quality Improvements. http://www.youtube.com/watch?v=Y63SKeEiN3Q

Dealing with stormwater is a complicated and expensive issue for many urban communities, and hundreds of small towns throughout the Commonwealth deal with these issues every time it rains. Increasing development pressures and impermeable surfaces further exacerbate the issue. This is where proactive planning and green infrastructure, like streamside buffers, can greatly assist communities in dealing with stormwater problems. A riparian buffer can help to prevent property damage and the expense of flooding[2] and reduce on-site stormwater management costs.

Streamside forests provide a stormwater function because they capture, absorb, and store amounts of rainfall up to 40 times greater than disturbed soils, like agricultural fields or construction sites, and 15 times more than turf grass.[18] Research has consistently concluded that because of these benefits, those projects which preserve and restore buffer systems often require less or smaller-sized stormwater infrastructure.[19] This fact is widely recognized, and many state and local stormwater management programs, including Maryland's, allow for the "crediting" for the volume and rate of runoff from built areas as long as it is discharged by sheet flow to intact buffer systems. In fact, Fairfax County, VA, estimated that such forests were providing almost $57 million (1999 dollars) in stormwater reduction benefits annually to local taxpayers. This represents an opportunity cost that was not realized by the tax-payers.

Streamside forests also enhance habitat for fish and other aquatic organisms—a vital component for maintaining stream ecological health. Woody debris and decaying leaves add organic food and support biological abundance, diversity, and productivity in streams.[20] In small upland streams, as much as 75 percent of the organic food base in a stream may be supplied by dissolved organic materials or detritus from the adjacent forest canopy.[21] Benthic organisms feed on this material, forming the basis of the aquatic food chain,[7] therefore supporting ecologically important game species like Pennsylvania's native brook trout.

The tree canopy created by a streamside buffer contributes to the health of the stream by maintaining cooler water temperatures and by providing healthier habitats for economically and environmentally important fish species, like brook trout and brown trout. Recreational fishing provides over $4.75 billion of **increased economic activity** to Pennsylvania's local communities.[22] Buffers, by providing fundamental habitat and maintaining cool waters, play a significant role in supporting such economic activity. The warming of a stream reduces the oxygen carrying capacity of the waterway, harming stream life that is temperature-sensitive. The enhanced habitat and cool water temperatures that forested buffers provide to streams

[18] Palone, R.S. and A.H. Todd (editors.) 1997. Chesapeake Bay riparian handbook: a guide for establishing and maintaining riparian forest buffers. USDA Forest Service. NA-TP-02-97. Radnor, PA.

[19] Miller, A.E. and A. Sutherland. 1999. Reducing the Impacts of Storm Water Runoff through Alternative Development Practices. Office of Public Service & Outreach, Institute of Ecology, University of Georgia, Athens, GA.

[20] Sweeney, B, T.L. Bott, J. K. Jackson, L. A. Kaplan, J. D. Newbold, L. J. Standley, W. C. Hession, and R. J. Horwitz. 2004. Riparian deforestation, stream narrowing, and loss of stream ecosystem services. PNAS, September 2004; 101: 14132–14137

[21] Welsch, D. J. 1991. Riparian Forest Buffers - Function for Protection and Enhancement of Water Resources. NA-PR-07-91. [Broomall, PA:] U.S. Dept. of Agriculture, Forest Service, Northern Area State & Private Forestry.

[22] Upneja, A., E. L. Shaffer, W. Seo and J. Yoon. 2001. "Economic Benefits of Sport Fishing and Angler Wildlife Watching in Pennsylvania." Journal of Travel Research 40(August):68-78.

establish the framework for sustainable, economically productive fisheries as well as a host of other aquatic species, many of which brook trout depend on.

While the **presence of buffers clearly improves fish habitat measures, the lack of a sufficient buffer can lead to severe losses of important game species.** A study of Pennsylvania streams found increases of 4 to 9 degrees Fahrenheit when forested buffers are lost, which is the equivalent of moving the stream over 400 miles south.[23] Klapproth and Johnson (2000) also noted water temperatures are important in regulating phosphorus concentrations, as when water reaches above 60°F, phosphorus is more readily released from its sediment hosts and dissolved into the stream as a pollutant. Increased water temperatures also produce heavy growth of filamentous algae (from increases of 9°F), encourage the growth of parasitic bacteria, and can adversely affect benthic organisms.

Meyer et al. (2005)[24] noted that not only the presence but also the size of forested stream buffers have a profound impact on a stream's ability to support trout populations. Researchers found that when **forested buffer widths were reduced from 100 feet to 50 feet,** stream temperatures increased 2.9°F to 4.2°F while fine sediments increased 11%. Although these changes may appear small numerically, they **resulted in an 81-88% reduction in young trout populations.**

Forested buffers also **reduce the costs of treating drinking water.**[25] According to Penn State University, 56 percent of Pennsylvanians get their drinking water from surface waters, including 43,000 miles of streams, 2,300 reservoirs, and 76 natural lakes.[26] Research has indicated that trees play a vital role in maintaining the quality of the water entering drinking water treatment plants and, therefore, reduce the costs of treatment. In fact, for every 10% decrease in forest cover in a watershed, treatment costs increase approximately 20%.[27] The USEPA estimates that the treatment cost to source water protection ratio, which includes forest buffer preservation/restoration, on average, is 27:1. Thus, for every $1 spent on source water protection, $27 is saved in treatment costs. An analysis of the Gettysburg source water protection program yielded a ratio of 178:1.[28]

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[23] Klapproth, J. and J. Johnson. 2000. Understanding the Science Behind Riparian Forest Buffers: Effects on Plant and Animal Communities. Virginia Cooperative Extension, Virginia State University, Charlottesville, VA. Publication No 420-152.

[24] Meyer, J. M., et al. 2005. Implications of Changes in Riparian Buffer Protection for Georgia's Trout Streams. Institute of Ecology, The University of Georgia, Athens, GA.

[25] Pennsylvania Source Water Protection. Role of Forests and Drinking Water. http://www.sourcewaterpa.org/?page_id=3066

[26] Penn State University. Pennsylvania Impact: Cleaner Water for Pennsylvania. Website: http://paimpact.cas.psu.edu/agr9973.html

[27] Ernst, C., R. Gullick, K Nixon. .2004. Protecting the Source: Conserving Forests to Protect Drinking Water. American Water Works Association Optflow Vol. 30, No. 5, May 2004.

[28] Winiecki, E. 2006. Economics and Source Water Protection [PowerPoint slides]. http://yosemite.epa.gov/r10/water.nsf/c6e3c862e806dd688825688200708c97/04a73c144395fda18825702e00650eb2/$FILE/Economics_of_SWP_E_Winiecki_EPA.ppt#8

David Cassells, a World Bank forest specialist says, **"Protecting forests around water catchment areas is no longer a luxury but a necessity. When they are gone, the costs of providing clean and safe drinking water to urban areas will increase dramatically."**[29]

Streamside Forests are one of the most Cost-Effective Practices documented

A 2010 report[30] by the World Resources Institute attempted to quantify the average costs of nitrogen removal in dollars per pound for the Chesapeake Bay Watershed. In general, the report found that agricultural practices which rely on planting of permanent and temporary vegetation (primarily trees, grasses, and shrubs) were far less costly to install than practices which required large amounts of capital upgrades.

Of particular note, the report found that for each pound of nitrogen removed required an investment of $3.10 in a forested riparian buffer. Conversely, stormwater management on new development sites cost, on average, $92.40 per pound of nitrogen removed. In short, **streamside forests are nearly 29 times less costly at nitrogen pollution removal than post-construction stormwater management techniques.**

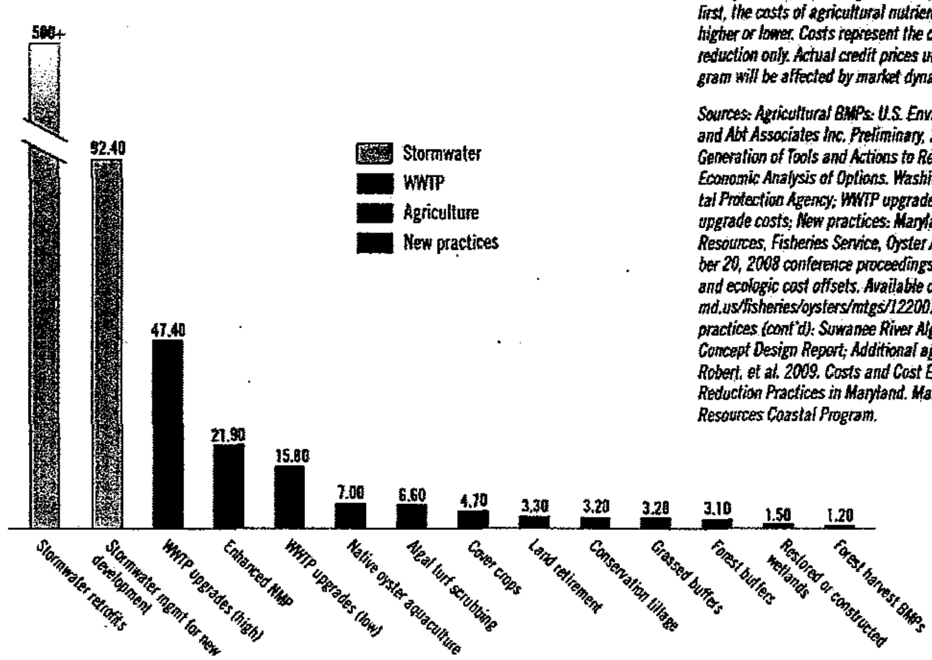
Additionally, the Center for Watershed Protection recently completed a study for the James River Association that evaluated the cost-effectiveness of post-construction stormwater management practices.[31] This study considered the cost-effectiveness of 39 commonly implemented practices in terms of average annual cost for each practice over 20 years and the annual pollutant reduction in pounds per year. For stormwater pollution reduction, **forest riparian buffers were the single most cost-effective practice in addressing nitrogen pollution and the third most cost-effective practice at mitigating phosphorus pollution**, according to the study.

[29] Trust for Public Land and American Water Works Association. 2004. Protecting the Source: Land Conservation and the Future of America's Drinking Water. San Francisco, CA

[30] Jones, Cy, et al. 2010. How Nutrient Trading Could Help Restore the Chesapeake Bay. WRI Working Paper. World Resources Institute, Washington DC. http://www.wri.org/stories/2009/12/how-nutrient-trading-can-helprestore-chesapeake-bay

[31] Center for Watershed Protection. Cost-Effectiveness Study of Urban Stormwater BMPs in the James River Basin, June 2013. http://www.jamesriverassociation.org/what-we-do/JRA-Cost-effective-Full-Report-June-update.pdf

FIGURE 1. Average Cost of Selected Nitrogen Reduction Measures
Dollars per pound of annual nitrogen reduction



Note: Cost estimates do not take into account the baseline or minimum practices that agriculture will have to implement prior to selling credits. Depending on which practices farmers implement first, the costs of agricultural nutrient reduction measures may be higher or lower. Costs represent the costs of achieving the nitrogen reduction only. Actual credit prices under a nutrient trading program will be affected by market dynamics of supply and demand.

Sources: Agricultural BMPs: U.S. Environmental Protection Agency and Abt Associates Inc. Preliminary, 2009. Chesapeake Bay: Next Generation of Tools and Actions to Restore the Bay: Preliminary Economic Analysis of Options. Washington, D.C.: U.S. Environmental Protection Agency; WWTP upgrades: WRI analysis using plant upgrade costs; New practices: Maryland Department of Natural Resources, Fisheries Service, Oyster Advisory Commission. December 20, 2008 conference proceedings: Oyster restoration economic and ecologic cost offsets. Available online at: http://www.dnr.state.md.us/fisheries/oysters/mtgs/122007/meeting122007.html; New practices (cont'd): Suwanee River Algal Turf Scrubbing System Concept Design Report; Additional agricultural BMPs from Wieland, Robert, et al. 2009. Costs and Cost Efficiencies for Some Nutrient Reduction Practices in Maryland. Maryland Department of Natural Resources Coastal Program.

Pennsylvania Chapter 102 and Forested Riparian Buffers

On November 19, 2010, amendments to Pennsylvania's state regulation for erosion and sediment control and stormwater management went into effect.

The purpose of Chapter 102 is to protect, maintain, reclaim and restore water quality in the Commonwealth. The revised regulation, which had been in development for several years and subject to significant public review and input, incorporated the Federal Clean Water Act "Phase II" National Pollutant Discharge Elimination System (NPDES) permit requirements for stormwater discharges associated with construction activities, codified existing post-construction stormwater management (PCSM) requirements, including long-term operation and maintenance requirements of PCSM best management practices (BMPs), incorporated specific antidegradation implementation provisions, updated agricultural planning and implementation requirements, and updated erosion and sediment (E&S) control requirements. These advancements, based on the state-of-the-science and engineering, in Chapter 102 also established riparian buffer provisions. In Section 102.14 the regulations established that for land development projects within HQ/EV watersheds that are attaining use at the time of application, no earth disturbance should occur within 150 feet of a defined waterbody, and any existing riparian buffer should be maintained. If, at the time of application, uses are not being attained and the waterbody is considered "impaired" by the Commonwealth, protection and restoration of a 150-foot forested riparian buffer is required.

Other State Programs

Other neighboring states have also recognized the value of riparian buffers. For example, New Jersey requires buffers along all streams with increased widths along trout streams and special protection waters. Virginia requires riparian buffers to implement the Chesapeake Bay Preservation Act. Maryland has buffer regulations to protect tidal waters, tidal wetlands, and streams that are tributaries to the Chesapeake Bay. Riparian forest buffers provide other economic benefits and intrinsic value to land. Massachusetts, Georgia, and Alaska also have riparian buffer regulations, in some aspects greater in requirement to Pennsylvania's, along with a number of other states with standards, guidance, or policy promoting riparian buffer restoration or preservation.

Waivers to the Chapter 102 Forested Riparian Buffer Requirement are Available

We believe that the forested buffer requirement under Chapter 102 is not onerous by design.

First of all, as noted above, only about 0.8 percent—or a little over 700 miles—of all streams in the Commonwealth are classified as either HQ or EV and are also considered "impaired" by DEP. Only these streams are required to have restoration of a forested riparian buffer for projects meeting the thresholds of Pennsylvania's Chapter 102 regulations.

Secondly, the buffer protection is only triggered by the need for land development projects requiring a National Pollutant Discharge Elimination System (NPDES) permit and therefore does not apply to any existing landowners and their current land use, but only in a new or redevelopment context. It is also important to note that subsection (d) of Section 102.14 provides a long list of exceptions to the buffer requirement. These exceptions include: a project site located greater than 150 feet from a named Special Protection waterbody; activities involving less than one (1) acres of earth disturbance; activities when a permit is not required under Chapter 102; activities where the permit was acquired before November 19, 2010; road maintenance activities; repair and maintenance of existing pipelines and utilities; oil, gas, timber harvesting or mining activities; single family homes not part of a larger common plan or development; and activities authorized by a Department permit under another Chapter or title. See. 25 Pa Code §102.14(d).

CBF's Watershed Restoration Program

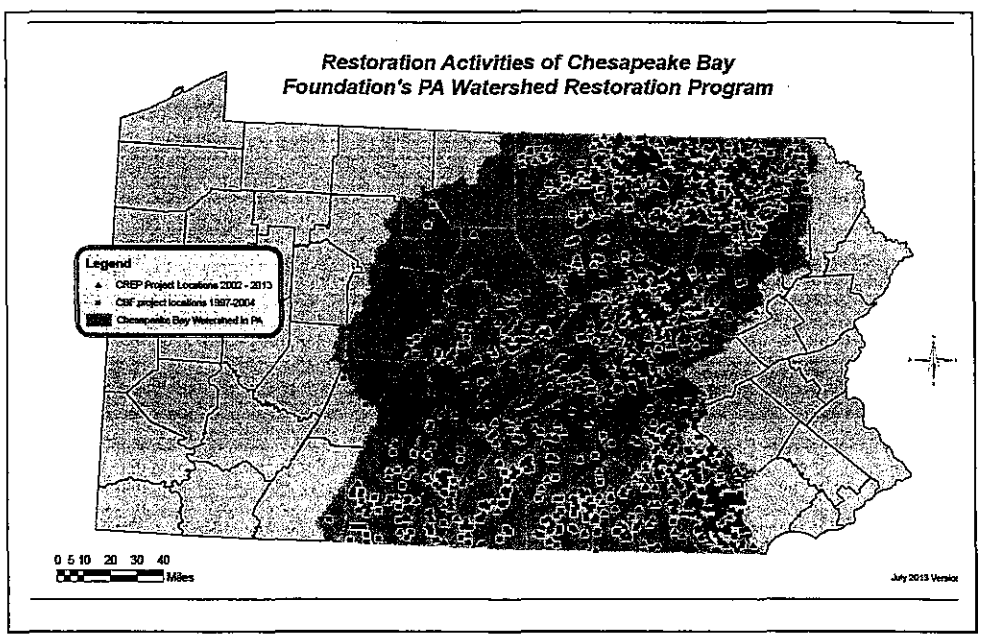
Since 1997, the Chesapeake Bay Foundation has directly invested and leveraged more than $25 million toward helping farmers and rural landowners implement conservation measures or access technical and financial assistance from other conservation partners.

Core to our program is the re-establishment of lost forested riparian buffers. Through our restoration program, CBF has directly assisted 1,635 landowners and installed 7,773 acres of forested buffers (or a total of 824 miles) through the USDA Conservation Reserve Enhancement Program (CREP) and other programs in Pennsylvania. CBF and our many PA CREP partners have leveraged roughly $95 million in state and federal funds and collectively assisted over 5,000 PA rural landowners to install over 20,000 acres (roughly 2,200 miles) of forested buffers.

Recognizing the significant role of agriculture in watershed protection and restoration, CBF has for decades partnered with thousands of farmers, agricultural organizations, and conservation agencies to implement a broad array of cost effective pollution reduction practices on farms. Collectively, these practices are called agricultural "Best Management Practices" or "BMPs" which provide the majority of planned nitrogen, phosphorus, and sediment reductions in Pennsylvania's Watershed Implementation Plan for achieving the Chesapeake Bay Clean Water Blueprint. They include:

- Improving stormwater controls around barnyards and buildings to keep soil and excess nutrients from running into streams;
- Improving manure storage and handling facilities;
- Fencing cattle from streams and providing them with a healthy drinking water source;
- Planting trees and native vegetation along streams to filter pollution; and
- Using no-till planting techniques and cover crops during the off-season to protect fields from erosion.

CBF's special projects and funding have leveraged additional federal and state funding many times over and have modeled effective conservation strategies that seek more conservation results for the dollar.



As a result of our watershed restoration efforts, a large number of on-farm practices and projects that qualify as "conservation that counts" yielding a multitude of on-farm, local, and regional improvements, have been implemented, providing significant benefits to residents of the Commonwealth.

In 2009 and 2010, CBF and partners worked with the Pennsylvania Infrastructure Investment Authority (PENNVEST) to invest $14.9 million in federal stimulus funding (American Reinvestment and Recovery Act or ARRA) to install 224 BMPs on 44 farms to enable farmers to meet and exceed compliance requirements. This project clearly demonstrated that if encouraged and enabled to do so, most farmers are willing to install wider forested buffers along with traditional BMPs to provide superior and cost effective pollution reduction.

CBF is currently offering an innovative approach to working with farmers who are willing to take conservation to a higher level called the "Buffer Bonus Program." CBF's Buffer Bonus is an incentive payment farmers receive for every acre of streamside buffer they install. This bonus must be spent on other conservation projects on the farm, *and* the farmer must agree to address all critical runoff concerns on the farm under approved soil and manure management plans.

Buffer Bonus gives land-tight farmers an incentive to put a wider swath of their streamside property into a forested buffer that then provides greater water quality and wildlife benefits than simply fencing cattle out of the stream. At the same time, the farmer receives extra funding to implement more BMPs on the farm. In piloting the program, CBF and partners focused on two very different regions of the state–in the north central, Bradford County area; and in the south central region of Lancaster and Chester counties.

In the northern region, CBF coordinated a $1.6 million effort with partners in Bradford County and surrounding counties to assist over forty farms in the installation of 430 acres of forested stream buffers and 218 agricultural BMPs. This recent effort comes on the heels of decades of conservation innovation by the Bradford County Conservation District and USDA's Natural Resources Conservation Service. CBF recognized this leadership by presenting the former Manager of the Bradford County Conservation District, Mike Lovegreen, with CBF's "Conservationist of the Year" award for 2013 for their remarkable success in improving conservation on farms and seamlessly integrating forested buffers with other farm improvements throughout the county.

In Lancaster and Chester Counties, CBF and partners recently completed a $1.5 million effort to assist over sixty Amish and Old Order Mennonite farmers in conservation planning, forested buffer planting, and BMPs installations to meet and exceed compliance requirements. Project results include installation of 367 BMPs, restoration of 126 acres of forested buffers, and development of 48 conservation plans.

In addition to the funding described above, the Buffer Bonus Program leveraged significant additional federal and state funding that, taken together, increased water quality benefits while demonstrating innovative funding strategies for farmers. Currently CBF is offering the Buffer Bonus Program in Bradford, Centre, Franklin, and Lancaster County regions.

Summary

Streamside forests are one of the best practices at restoring and protecting Pennsylvania's rivers and streams. The science is robust, clear, and growing—forested buffers provide vital habitat to economically important game fisheries, protect drinking water sources, help reduce flooding and thereby protect properties, increase property values, provide habitat to beneficial upland wildlife, keep pollutants out of the water, and enhance the attenuation and breakdown of those pollutants that get do get in.

Forested riparian buffers, through the protection of existing and the re-establishment of lost buffers, are an integral component of Pennsylvania's efforts under the Chesapeake Bay Clean Water Blueprint. **Without protected and restored streamside forests, Pennsylvania's requirements to meet the pollution load reductions outlined in the Chesapeake Bay Total Maximum Daily Load (TMDL) and the Commonwealth's associated Watershed Implementation Plans will be more difficult and more costly to achieve.**

No other pollution reduction practice provides so much benefit for so little investment.

Thank you for the opportunity to share our views.