



Volunteers near Hagerstown, Md., plant a riparian buffer.

J. Willoughby

Seeing the Forest for the Trees

Trees have become one of the poster children for clean water, with their inexpensive price tag, long life spans, and numerous benefits for water quality. Watershed groups, government groups, including ICPRB, and others have helped fuel this effort by hosting tree planting events, assisting with funding for riparian buffers, and even collecting seeds and nuts.

Just how good are trees for the watershed? “Trees help keep pollution out of the rivers by minimizing runoff. Fewer trees means less protection,” said Kate McNamee, Potomac Conservancy’s Growing Native outreach coordinator. Trees can also save money by keeping waterways cleaner and reducing soil erosion and energy costs, among other benefits. From seeds and seedlings to mature forests in urban and suburban areas, Watershed groups, government agencies, and individuals are using trees in a variety of landscapes to improve their communities both environmentally and economically.

Riparian Buffers

Since 2002, the Potomac Watershed Partnership and Potomac Conservancy has led Growing Native, an effort that brings volunteers throughout the Potomac watershed together to “Get Nuts for Clean Water.” With autumn volunteer seed collection events in West Virginia, Virginia, Pennsylvania, and Maryland, the nearly 10,000 pounds of seeds collected through the Growing Native program in 2008 will go to their respective state nurseries. They will grow at the nursery for about one year. Most of the Growing Native seeds are destined to become seedlings in riparian buffers, areas of stream-side shrubs and trees. With each costing under one dollar, they are just the right price.

While seedlings help recreate riparian buffers, conserving the existing stream-side vegetation is one of the most important factors in maintaining waterway health. Seedlings take years to fill in and produce more offspring. Ideally, riparian buffers should be left in place when developments are created, but it’s far easier and less

Our mission is to enhance, protect and conserve the water and associated land resources of the Potomac River and its tributaries through regional and interstate cooperation.

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expensive to mow down the trees that are there and simply plant grass to the stream edge. According to the State of Chesapeake Forests Report by The Conservation Fund, "Urban and rural forests are critical to reducing stormwater runoff from small storms-storing and filtering up to six times more rainfall than grass and 20 times more than a parking lot."

It takes political will to decide that mature riparian buffers will stay and developers must work around them. Frederick County, Md., has just passed an ordinance that ensures a 100-foot minimum stream buffer for all new development on subdivided parcels. As the slope increases, the buffer requirement also increases, up to nearly 330 feet in some cases. The buffer must remain intact, save for a few exceptions, such as utilities, bike trails, and other necessary infrastructure. Buffers cannot be removed and then replanted. Frederick County Principal Planner Tim Goodfellow said, "We feel that it will prevent further degradation of our waterways by maintaining larger distances between grading, construction, and other building activities and our sensitive aquatic resources. It will provide a wider area for infiltration and groundwater recharge." Similar ordinances exist in many Potomac watershed jurisdictions, such as Montgomery County, Md., and Northumberland County, Va.

Urban and suburban forests are equally important as riparian buffers to watershed and for human health. According to the State of Chesapeake Forests report, reducing forest land in a watershed by only 10 percent can mean a 40 percent increase in nitrogen loads to the waterway. These increased loads can cancel out the large sums being spent to reduce nutrients under the Chesapeake Bay cleanup.

Shade Trees

Often overlooked are the mature shade trees that are lost to development or age. Saplings are often planted as replacements for these mature trees. Saplings, larger caliper young trees, fare a little better than seedlings because their tender buds and new leaves are higher up and out of the reach of hungry deer and are more difficult to run over with lawnmowers. Steve Saari, Washington, D.C. Department of Environment (DOE) Watershed Protection Specialist noted that as older, mature trees die in D.C., they are often replaced with small, ornamental trees that will not provide shade when mature. In addition, many ornamental trees are not as well-adapted to the region, where a native tree would thrive.

Casey Trees, through a grant from the DOE, has a three-fold program to increase the urban forest in the city and help homeowners pick the right tree for their landscape. Casey Trees' Director of Tree Planting, Jim Woodworth, noted that trees

are important to the urban environment because they instill a sense of “neighborhood pride and aesthetics, they conserve energy, and improve water quality.”

Through the program, Casey Trees first offers a \$50 rebate for trees planted on private property, from an extensive list of tree species. The second program is a homeowner design workshop, including where to plant a shade tree for maximum benefit. After finishing the workshop, homeowners get a shade tree delivered to their home. The third and most comprehensive program is RiverSmart Homes, currently a pilot project focusing on an area between Massachusetts and Pennsylvania avenues east of the Anacostia River. RiverSmart Homes involves a landscape audit by DOE after which, homeowners are offered a range of improvement strategies for free up to a total of \$1200. Shade trees, rain barrels, rain gardens, native landscaping, and conversion of impervious pavement to pervious pavers are all part of the program. Beginning in spring 2009, homeowners throughout the city will have the opportunity to enroll with DOE for watershed-wise upgrades tallying up to \$1,200. They also learn the “hows” and “whys” of their new green landscape.

Pennsylvania also is working on its own TreeVitalize program throughout the state. “We were seeing alarming losses of tree cover in urban areas,” said Christina Novak, Pennsylvania Department of Conservation and Natural Resources (DCNR) press secretary. Piloted first in Philadelphia and Pittsburgh, the program is expected to expand to 12 other urban areas throughout the state in the coming years. TreeVitalize was conceived by the Pennsylvania DCNR and works with partners to achieve the goal of 1,000,000 trees planted by 2012 by restoring both riparian buffers with seedlings and reclaiming public urban space with saplings. Though none of the targeted urban areas are in the Potomac watershed, most are in the Chesapeake Bay watershed and will contribute to its overall health.

Putting dollar amounts on trees can be tricky, but the TreeVitalize website cites that the loss of trees in the Delaware Valley meant, “the capacity to detain stormwater was diminished by 53 million cubic feet annually, a \$105 million service. Each year 1.7 million pounds fewer pollutants were absorbed, a \$3.9 million service, and 1,373 tons less carbon was captured in the making of wood.” In addition to the money trees can save, they also improve quality of life by “increasing property values, calming traffic, and reducing stress,” according to the TreeVitalize website.

Patchwork Forests

Low-impact development, solar



upgrades, and wind power have dominated the “green” news lately. These building technologies are a terrific advancement and in the future, their costs will be affordable to the masses. However, the most cost-effective way to help the watershed and the wallet is maintaining the watershed’s forests.

Forestry for the Bay Coordinator Craig Highfield said, “according to modeling conducted at the Chesapeake Bay Program, 700,000 acres of existing woodlands are reducing the amount of nitrogen from the [Chesapeake Bay] watershed by 3.1 million pounds per year. Their conservation is, therefore, the best BMP for non-point pollution.” Best management practices, or BMPs, could include better farming techniques, settling ponds, septic pumping, and other practices that help reduce pollution. Highfield also noted that the total remaining forests in the watershed (24 million acres) prevent over 180 million pounds of nitrogen from reaching the Bay each year. That amount is over three times the annual nitrogen reduced from all sources over the past 20 years.

Trees play an important role in our ecosystem, but they also are an important part of our lives. “They also are already safeguarding wildlife habitat, contributing annually to local economies, protecting public health by providing for clean air, providing recreation opportunities, and enhancing the quality of life for all citizens,” said Highfield. Forestry for the Bay, an outreach and education group for small forest landowners, helps keep small forests, well, forested. The program is open to anyone and the group will help forest landowners get resources and funding for forest plans, invasive controls, and other forest practices, and to help build a community of small forest landowners as mentors.

Forestry for the Bay, with its focus on the nearly 70 percent of Bay landowners that hold fewer than 10 acres of forest, may be saving more than just the trees. These intact forests literally sop up the excess nutrients from farms and urban and suburban lawns. Many Potomac subwatersheds have less than 10 percent forest cover with interior conditions, which means forests that can support animals and plants that require larger habitat where “extreme weather and predation” are minimized, according to the State of Chesapeake Forests Report.

There will always be trade-off between development and trees. With so many flashy alternatives for going green and helping the environment, the easiest and most cost-effective option might be right

under our noses, or, above our heads. Whether you live in an apartment in the city or own several acres of forest, there is plenty everyone can do to help the watershed and the wallet.

Are Acorns Nature's Newest Unicorns?

Scientists, citizens, children, well, everyone has noticed the lack of crunch beneath their feet this year. Many oaks have produced no acorns this year and others are producing minimal amounts of acorns. The phenomenon is widespread, from Canada through the mid-Atlantic. Tree experts wonder if the oaks will become nature's next unicorn--nearly impossible to find.

So what's behind the missing acorns? Tree experts aren't sure. Oaks are typically cyclical in their acorn production. That means that they may produce a bumper crop every two or three years and many fewer in other years. However, the complete lack of acorns in many areas is not a normal part of that cycle.

Tree experts are waiting to see if the trend continues into 2009 before they get alarmed. After all, oaks produced a bumper crop of acorns in 2007, which could mean the trees are simply taking a break this year.

Many Chemicals Remain in Drinking Water After Treatment

An array of pesticides, personal care products, household and industrial solvents were detected at very low levels in drinking water systems around the country, according to the U.S. Geological Survey (USGS).

A recent study of nine U.S. rivers, including the Potomac, examined the levels of some 260 man-made chemicals in both the rivers and in finished water from drinking water treatment plants. The USGS researchers worked closely on the Potomac portion of the study with the Washington Aqueduct, a division of the U.S. Army Corps of Engineers that treats Potomac water distributed for drinking in Washington, D.C. and parts of northern Virginia.

The 260 chemicals monitored included gasoline hydrocarbons, household products, disinfection byproducts from treatment plants and manufacturing chemicals, but did not include pharmaceuticals or hormones. Low levels of 130 of the chemicals were found in streams and rivers, and about two-thirds of those chemicals were detected at very low levels in treated drinking water, the report noted. Many of the substances are not regulated for drinking water, and so do not require monitoring or removal. Of the regulated compounds, none were found in amounts that have been documented to cause human health concerns.

The study identified 17 chemical

compounds in treated drinking water from the Potomac. They included the herbicides atrazine, metachlor and simazine, the industrial fragrance HHCB, the gasoline



C. Dalpra

Pesticides, gasoline, drugs, household chemicals, and other substances enter waterways through runoff or treated sewage. Some of these chemicals show up in our drinking water.

additive MTBE, several solvents, and caffeine. Most of the substances were found at levels of only a fraction of a part-per-billion, and the levels of many substances were similar in both river and treated water, indicating that standard treatment processes don't remove much of these types of chemicals. About 76 percent of the chemicals found in river water were found at concentrations of less than 0.1 part per billion. That is a level equivalent to a thimble of substance in an olympic-size pool of water, the report noted.

Potomac a Bright Spot for American Shad

The study's researchers and local water utility managers agree the results of the study should not raise concerns about the safety of the region's drinking water. "Low level detection does not necessarily indicate a concern to human health, but rather indicates what types of chemicals we can expect to find in different areas of the country," said USGS Lead Scientist Gregory Delzer. The methods used to detect the substances can find trace amounts from 100 to 1,000 times lower than drinking water standards require.

While the substances found in drinking water, taken separately, "are expected to be negligible," to human health, little is known about how these substances might interact with one another, and the report notes that more research is needed. Even less is known about how some of the chemicals may affect aquatic health, which was not a focus of the study. A 150-pound person who drinks water containing the trace substance amounts may be less affected than a one-pound fish or tiny invertebrate that spends its life continuously exposed to these substances. Atrazine, an herbicide commonly found in the sampling, is one of a number of suspects in the intersex condition in fish that has been found both in the Shenandoah and Potomac watersheds.

The study's findings are used by the U.S. Environmental Protection Agency, state governments, water utilities, and other organization to help protect drinking water supplies.

Tom Jacobus, general manager of the Washington Aqueduct, said that people should not be alarmed by the study. "Many of the substances found in drinking water are unregulated—there are no guidelines about them. It should come as no surprise that these substances that are regularly used and released into the environment also show up as trace amounts in drinking water. This study and ongoing research will help guide public health decisions and regulations that may result in advanced treatment strategies."

In the Potomac watershed, the region's water suppliers have been in close communication and coordination through the Potomac Drinking Water Source Protection Partnership (DWSPP). The group's members review the latest research, share ideas, and coordinate activities that focus on keeping a range of substances out of the sources of the region's drinking water. The group is working with other agencies and governments to adopt practices that reduce levels of substances that enter water through many pathways, including stormwater, groundwater, and industrial and agricultural operations. For more information about DWSPP, visit www.potomacdwspp.org.

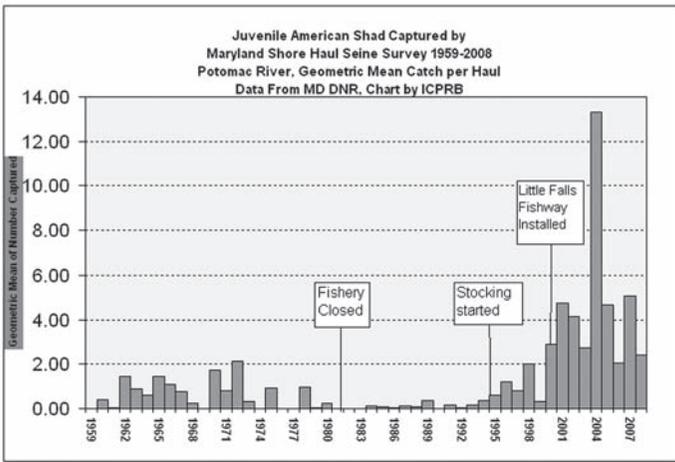
For more information on the USGS report, visit:

<http://water.usgs.gov/nawqa/swqa>.

Despite some leveling off in the numbers, the Potomac River continues to be the most productive river in the Chesapeake Bay for American shad. Numbers of adult and juvenile shad surveyed in 2008 fell sharply throughout the rest of the bay region, although recent efforts to reintroduce the species to Virginia's Rappahannock River using fry from Potomac stocks are showing signs of success. American shad are a migratory species that historically were one of the largest fisheries and ecological engines in the Chesapeake Bay watershed. Each spring, runs of shad heading upstream to spawn were heavily targeted. In the 1800s, the Potomac fishery reached its peak, when about 20-million fish were caught in a year. Low numbers of fish have kept the fishery closed due to water pollution, over-harvest, and loss of habitat.

This year's assessment of the Potomac showed a marked decline from the 2007 survey, although still above the average for the last 15 years, and much higher than the average from 1995 to the present. The ICPRB-led restoration program began in 1995 and ended in 2002, although replacement stocking continues. During the course of the program, almost 20-million fry were stocked in the river. The Potomac stock also has produced about 23-million fry that have been stocked in the Rappahannock. The project continues to survey stocks and provide fry used to stock other river systems and supply fertilized eggs used by area schools that hatch and grow the fry as part of an integrated school curriculum.

The educational aspect of the project provided another record. The schools component in 2008 included 54 classrooms, including six in Pennsylvania and three in New Jersey that are raising the shad fry for placement in the Delaware and Raritan river systems. The number of schools participating in the program has been as successful as the stocking. Each spring, spawning shad are collected for eggs, the bulk of which are sent to hatcheries, where the fry are grown out and used for stocking operations on the Rappahannock River. A small portion of the haul is distributed to the participating schools, which, through program partner Living Classrooms of the National Capital Region, have set up mini-hatcheries at their schools. Hatching the shad and growing them for a short period of time provides educators with a focus for biology, ecology, mathematics, history, and other curricula. Over the years, the program has involved hundreds of teachers, thousands of students, and many volunteers, who have been greatly enriched by the project.



Thanking the project, Sean Duffy, a 5th-grade science teacher at Waples Mill Elementary School in Fairfax County, Va., wrote in a letter: *As a demonstration site for children's conservation science, we do lots of fun environmental things. But the few weeks we have the shad tanks are the most exciting of the school year for 5th grade. The care and concern the kids show with the pH readings and the chemicals, even before we get the eggs, is fun to witness, and once we have the eggs, the whole school is abuzz with noise about what the 5th graders are doing. One of the more interesting things is you never know which of the kids will be absolutely smitten with the whole thing, it's not always the "smart" kid or some other obvious choice, instead it frequently is the quietest kid in the class who never gets to shine in other ways. And this is real science for a great purpose, right here in our backyard. And of course the few kids who get to go out and catch fish never stop talking about it, too bad the whole grade can't do that.*

In short, this program has quickly become a cornerstone of what we do to make science special in our school, and is a great example of how children can be positively engaged in an enterprise that taps into their altruism and enthusiasm and values their contributions to the greater good of society. I wouldn't want to teach 5th grade Ocean Science (a Virginia Standards of Learning requirement) without the program, and hope I never do!

Throughout the Chesapeake Bay and along the Atlantic Coast, the decreasing numbers of shad are something of a surprise to fisheries managers. Led by the Potomac, shad numbers had been inching up throughout the bay, but have been declining in most spots for the past few years. In the Susquehanna River, where millions of dollars have been spent on constructing fish passages to allow migrating fish past four hydroelectric dams, numbers of returning fish have crashed in recent years. The spring spawning run count at Conowingo Dam, the first blockage on the river, yielded less than 20,000 fish. In

2000, the count was more than 193,000.

While this year's Potomac numbers remain above the long term average, Jim Cummins, who designed and managed the ICPRB cooperative shad stocking effort, noted that production in the Potomac may be reaching a plateau. He had expected to see larger numbers of the fish based on fry recruitment from earlier years that should now be part of the spawning run.

There are no sure answers as to why more fish didn't show up in the Potomac, although there are a number of influences, including by-catch fatalities from other fisheries, greater predation of the fish in the bay and the ocean, and poor weather during the spawning run. Answers are unlikely to come unless more money is spent on researching shad stocks.

Cummins is more definite on some of the reasons that the Potomac has been as successful as it has. Since the 1960s, the river's water quality has improved greatly. Submerged vegetation has rebounded significantly, providing habitat and food sources for the fish. The fishery has been closed on the Potomac since 1982, and earlier in Maryland. In 2000, after a long effort, the single blockage to migration on the Potomac, the dam at Little Falls just upstream of Washington, D.C., was successfully modified. The modification opened up about 10 miles of very good



Students release shad fry into the Potomac. C. Dalpra

spawning and nursery habitat for the species, Cummins noted. Cummins hopes that shad stocks one day will be able to provide a recreational fishery that would raise public interest and appreciation for the fish that has been lost because of low numbers and fishing moratoria. Others in the field see that goal as very distant, but Cummins is optimistic. After all, he has seen things turn around quite a bit already. "At the beginning of the project, we found we couldn't beg, borrow, or steal the fish needed to get started. We went out on the Potomac, not knowing if we would find enough fish in the river to get started. And now we've gone from wondering if we

would find any eggs to the Potomac being the source of eggs for stocking efforts in the entire Chesapeake Bay, except for the James River.”

The resurgence of the American shad in the Potomac has been built on these many factors. These hopeful numbers come at a time when the Potomac and the Chesapeake Bay are facing increasing challenges from growth and development. The river and its shad are counting on the many volunteers, teachers, and students to help keep those numbers going in the right direction.

People interested in the shad project and other conservation measures can visit with project students at the National Casting Call at Fletchers Boat House in Washington on April 27. Please contact ICPRB if you would like to attend and taste some freshly planked shad.



Watching the River Flow

Flow of the Potomac River measured near Washington, D.C., was well below normal during October and November 2008, according to provisional data from the U.S. Geological Survey.

In October, average flow of the Potomac, measured near Washington, D.C., was about 2 billion gallons per day (bgd), about 52.3 percent less than the long-term average of 4.2 bgd. Daily extremes during the month ranged from a high of about 4.88 bgd on October 1, dropping to a low of about 1.25 bgd on October 24. Water taken from the river for metropolitan water supply averaged about 400 million gallons per day (mgd).

November flows were even lower. The Potomac River flow for the month was about 1.9 bgd, or about 62.5 percent less than the November average of about 5.2 bgd. The river's flow ranged from a low about 1.5 bgd on November 12, and quickly rose to its monthly high of about 2.8 bgd on November 18. Withdrawals for water supply averaged about 300 mgd in November.

USGS Stream Gage Network Needs Firmer Foundation

Last-minute agreements with federal and state partners helped limit the number of stream gages that were recently discontinued in the Potomac basin. At one time, up to 11 gages were threatened with closure due to a lack of funds (see July/August 2008 *Reporter*).

In the end, only three gages in the Potomac were discontinued: the North Branch Potomac at Pinto, Md., the Potomac mainstem stage gage at Williamsport, Md., and the Tuscarora, Md., gage. The USGS operates the gages, which can cost about \$13,000 annually, and seeks partnership agreements with other federal, state, or local governments and organizations.

The U.S. Geological Survey operates and maintains a network of approximately 7,500 stream gages across the nation. The gages, some of which collect water quality as well as flow information, are used for a wide range of purposes from basic knowledge about stream hydrology to use as tools that provide safe drinking water, flood protection, and planning and development purposes. In the last several years, federal funding sources for the gages have decreased, and the network of gages, known since 2000 as the National Streamflow Information Program (NSIP), has become increasingly underfunded. The ICPRB and other agencies are concerned that NSIP will continue to be undermined and a great resource to the country will be compromised or lost.

The ICPRB is one of more than 800 federal, state, local, and regional agencies that contribute funds toward maintaining stream gages they use in their work. Together, the partners in the program provide more than 70 percent of the funding that maintains the network. Additionally, despite recent increases in NSIP funding, the program currently is receiving about 20 percent of its planned budget. These fiscal issues require USGS staff to spend valuable resources in locating and maintaining funding partners to support the gages.

The ICPRB projects addressing Washington Metropolitan Area drinking water supply during droughts (including reservoir operations), availability and allocation of groundwater and surface water for potable supply and industrial use in growth areas, studies that produce Total Daily Maximum Load plans, and other hydrological and ecological studies in the Potomac River basin depend on a stable network of stream gaging stations operated by the U.S. Geological Survey. The ICPRB,

with the support of metropolitan Washington water suppliers sponsors three gages in the Potomac basin, but makes use of many more for various research projects noted above.

Most of the gages were salvaged through the support of state governments and other agencies. Increased pressure on federal, state, local and regional agencies make the effort a stopgap one that will have to be repeated in the future. This is an inefficient and costly way to maintain a stable gage network that is being increasingly used to provide data for science and land-use decisions. Ed Dohoney of the USGS Baltimore, Md., office noted that the agency would be gearing up again this spring to try to find funding for

existing gages.

The ICPRB, in concert with other agencies and organizations, is exploring ways to improve the stability of the network, including:

- ◆ Coordinating information and serving as a resource agency to ensure the availability of reliable and long term gage data.
- ◆ Consolidating funding from multiple sources to fund gage operations.
- ◆ Funding some gages in a long-term commitment.
- ◆ Encouraging full planned funding for the NSIP network.

These and other aspects of the stream gage network will be the focus at the Interstate Council on Water Policy (ICWP) Regional Streamgage Stakeholder Meetings in Philadelphia, Pa., on February 5-6, 2009. Some 30 organizations endorsed ICWP's December 2008 letter to Congress urging full implementation of NSIP. For more information on the meeting, visit www.icwp.org/cms.

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Potomac Basin

REPORTER

**Editors: Curtis M. Dalpra
Jennifer D. Willoughby**

Published six times a year by the Interstate Commission on the Potomac River Basin, 51 Monroe St., Suite PE-08, Rockville, MD 20850. (301) 984-1908.

(ISSN 1072-8627)

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This publication does not necessarily reflect official Commission policies. Funds for the *Reporter* are provided by the U.S. Environmental Protection Agency and the signatory bodies to ICPRB: District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia.

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51 Monroe St., Suite PE-08
Rockville, MD 20850

Address Service Requested

Printed on recycled paper with soy-based ink

November-December 2008