USDA National Agroforestry Center

Inside Agroforestry

Summer 2005

Half-full or half-empty of what?

A glass of water may be analogous to how people look at life, but a bigger question is, Would you drink the water? Clean water is not only important for drinking, it's also important to the land and wildlife.

Everyone lives upstream from somebody else. What we do on our land affects the quality of the water that we send downstream to our neighbors. With 73 percent of the United States in private ownership, landowners play a critical role in determining the fate of water quality.

This issue of "Inside Agroforestry" highlights collaborative efforts that are making a difference to protect our Nation's water. You'll also find interesting information and tools for you to use in local efforts to protect the resource we depend upon the most – water.

Riparian forests: improving water quality within the stream

Keep pollutants out of streams, help process those that are in them

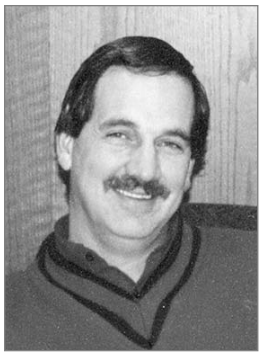
Bern Sweeney
Director/Senior Research Scientist
Stroud Water Research Center
Avondale, Pennsylvania

More than 20 percent of the world's population lack access to clean drinking water. In fact, more than 2.2 million people die each year from diseases caused by contaminated drinking water and poor sanitation. Now, new research suggests that streamside (or riparian) forests play a critical, and previously unacknowledged, role in protecting the world's fresh water.

Policies aimed at providing sufficient and clean fresh water have historically focused on massive and expensive engineering projects, such as dams and filtration plants. In doing so, they have often overlooked the substantial benefits that natural ecosystems provide. The Stroud Water Research Center in Avondale, PA recently completed new research that documents the considerable value of the

see **Riparian** on page 4

Inside



NAC Director's Corner

A commentary on the status of agroforestry
by Dr. Greg Ruark, NAC Program Manager

A need to restore ecosystem services

Historically, trees and shrubs naturally occurred in the riparian zones along most streams and rivers throughout the United States. Widespread forested riparian zones were even documented in the Great Plains in the mid-1800s. These riparian areas were essential for providing ecosystem services that protected water quality and provided wildlife habitat. However, today's intensive agricultural production systems have transformed our landscapes to the degree that most streams coursing through croplands are essentially devoid of perennial vegetation. In many watersheds, the hydrologic cycle has been significantly altered, stream channel erosion has increased, and non-point-source pollution of surface waters has become a major problem. In fact, a recent report by the National Research Council ("Riparian Areas: Functions and Strategies for Management," 2002) advocated that the restoration of America's riparian areas should be a national goal. But as this issue of "Inside Agroforestry" illustrates, it is often not sufficient to simply stop cropping adjacent to a stream or to only plant grass and other non-woody vegetation. If ecosystem services are to be restored to any substantive degree, then riparian forest buffers that incorporate trees, shrubs, grasses, and other vegetation are needed. Increasingly, improving or maintaining water quality will also depend on the extent to which rural and urban efforts within a watershed are coordinated.

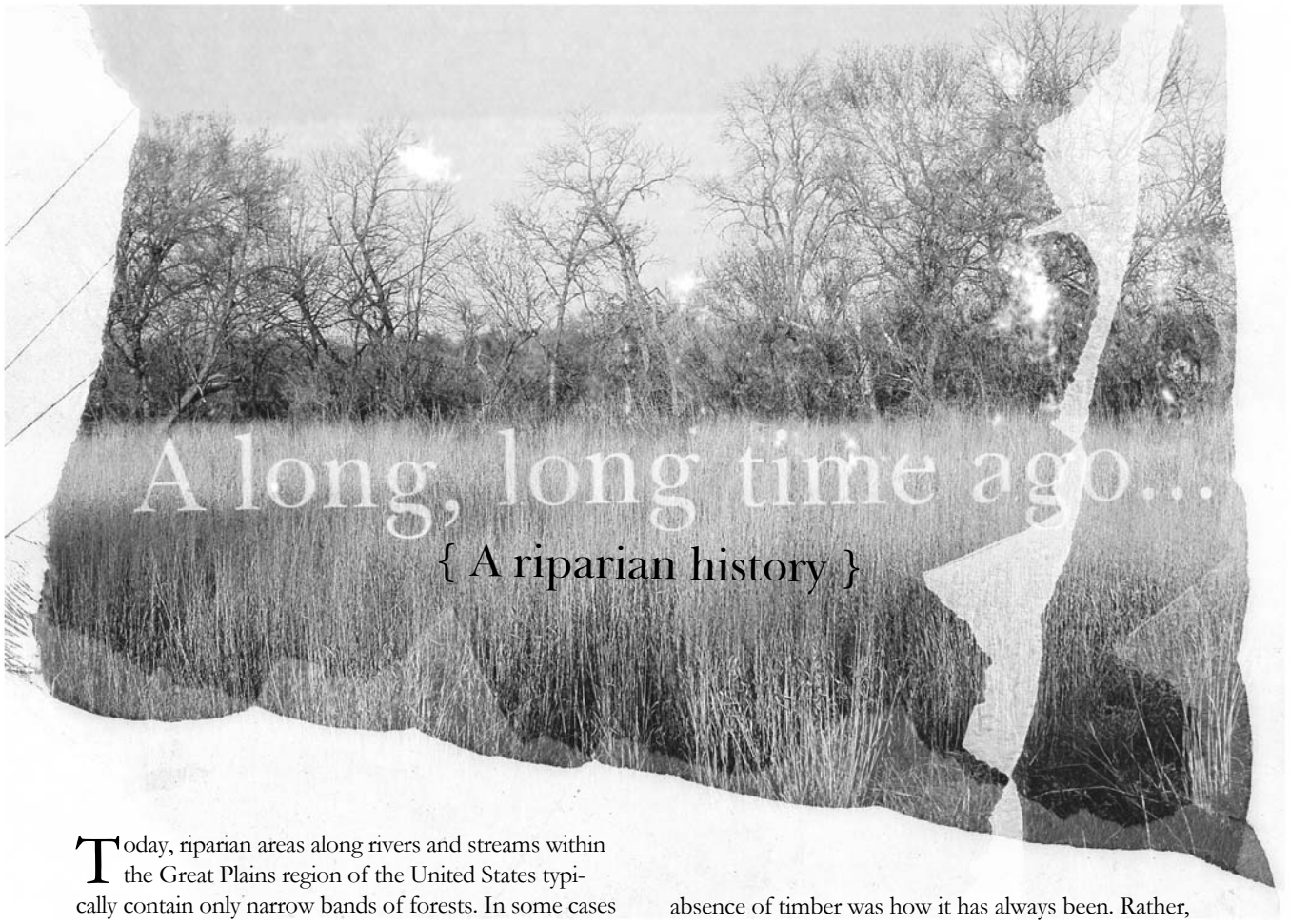
Water quality brochures hard-at-work

The new "Working Trees for Water Quality" (WTWQ) brochures are out there and working hard! Over 21,000 have been distributed worldwide since November 2004. Nancy Hammond manages NAC's database and handles brochure requests. She says that this brochure is reaching a wide audience that consists of schools, garden clubs, community board groups, in addition to natural resource professionals. Nancy says, "water quality is an important issue and it's great that we can fill a niche and supply the public and working professionals with the tools that they need to help us protect our nation's fresh water."

All of the *Working Trees* brochures are written and designed at a level to help inform and educate your clients including community members, landowners, youth, and others. They are developed to aid you with publicity and technology transfer to get *Working Trees* applied on the ground. The *WTWQ* brochure introduces readers to how agroforestry can help protect water quality while at the same time achieve both landowner and community objectives. More specifically, the *WTWQ* publication addresses sources of water resource problems and how to strategically incorporate *Working Trees* into the landscape to restore ecosystem services.

All of NAC's national scope *Working Trees* brochures have an accompanying display designed to assist with public information and education efforts. All displays are available on a first-come-first-served basis for conferences, workshops, fairs, and other events. To schedule use of a display, call Ryan Dee at 402–437–5178 ext. 14.

Visit NAC's Web site for a preview of any *Working Trees* brochures or coordinating displays, *www.unl.edu/nac*. You can order publications from the Web site or, if you prefer, contact Nancy Hammond at *nhammond@fs.fed.us* or fax her at 402–437–5712.



A long, long time ago...

{ A riparian history }

Today, riparian areas along rivers and streams within the Great Plains region of the United States typically contain only narrow bands of forests. In some cases riparian areas have no woody vegetation, and in far too many cases, are farmed up to the edge with row crops and grains. Natural resource professionals understand that disturbing vegetation in riparian zones greatly minimizes their ecological functioning. But, they may not agree on how to manage these areas now and into the future.

Knowing the historical makeup of Plains riparian areas is vital to understanding the important ecosystem services that those streams provided. To achieve these same ecosystem services, management can then become essentially a restoration effort. So, historically, what native plant communities were found in the riparian zones of the Great Plains? The answer to this question depends to a large extent on the time period that is used as a reference.

Many accounts from the early 1900s describe treeless or thinly represented tree conditions along watercourses. No one should conclude from these records that the absence of timber was how it has always been. Rather, in many situations, the lack of trees was the consequence of some of the most rapid and wrenching changes that the region has ever known. The land came under great pressure in the mid-1800s from the simultaneous and cumulative impact of Indians, gold seekers, soldiers, railroad crews, and settlers.

A recent National Academy of Sciences, Natural Resources Council report stated, "Restoration of riparian functions along America's water bodies should be a national goal..." (NAS, 2002)

To begin to understand what settlers who arrived early in the 1800s found, we need to begin a long, long time ago … prior to the construction of the transcontinental railroad spur lines in the 1860s; before the 1859 Denver gold rush; before the great westward movement of the 1840s along the Oregon Trail; and before Native Americans incorporated horses into their culture. These events all played important roles in determining the way riparian areas look today.

Given historical documentation from the 19th century, only a fraction of what is presented here, there can be no doubt that trees were commonly found along Plains streams. Riparian groves were safe harbors for Plains inhabitants during the winter months, when sudden

see **Historical** on page 11

Deforested reaches of 16 small Piedmont streams such as Birch Run in Pennsylvania (left photo) is shown to have much narrower channels than forested reaches located immediately upstream or downstream (right photo). The channel narrowing results in less stream habitat and ecosystem per unit length of stream and compromises in-stream ecosystem services such as the processing of pollutants.

Photos courtesy Stroud Water Research Center.

Riparian

continued from the front page

services that nature delivers free of charge. Perhaps nowhere is that value more evident than in streams and rivers, where the riparian forest teams up with trillions of tiny aquatic organisms to work constantly to clean the water. For some time, scientists and policymakers have recognized the role that riparian forests play in filtering pollutants before they enter the stream.

What the Stroud Center's research discovered is that such forests also play a vital role in protecting the health of the stream itself by enhancing the ability of its ecosystem to process organic matter and pollutants such as nitrogen. Conversely, the deforestation of riparian lands compromises both the quantity and the quality of a stream's ecosystem, thereby reducing its ability to deliver important services to humans.

The real significance of these instream findings is that it suggests that riparian forest buffers, which heretofore have been considered a best management practice for mitigating nonpoint pollution, are also effective for mitigating point-source pollutants. After all, if a given reach of stream is 10 times better at processing nitrogen because of a riparian forest, it will do it whether the nitrogen molecules come from an agriculture field or a sewage treatment plant.

In the study of 16 streams in the Piedmont of Pennsylvania and northern Maryland, the scientists found that stream sections flowing through forested areas are wider and shallower than those in meadowlands, their beds are rougher and have more habitat, and water moves more slowly through them. These factors, along with other riparian forest benefits, such as a greater variety of organic food and more natural temperature patterns, produce a richer and more natural ecosystem than do deforested streams, and the increased abundance of bacteria, algae, invertebrates, and fish enables them to better process certain pollutants. The study showed, for example, that the uptake of nitrogen was 2 to 10 times higher in forested reaches relative to deforested reaches.

Because the study was conducted on small streams, which comprise more than 90 percent of all streams in the United States, the implications for improving water quality by planting trees along streambanks are enormous, for forested streams can deliver cleaner water to downstream rivers, estuaries and, ultimately, oceans. Furthermore, while these findings are based on detailed studies in eastern North America, there is a growing body of independent data that suggests they are applicable across North America and on a global scale. The Stroud Center results reinforce U.S. policies that endorse riparian forest buffers as best management practices along small streams, as well as public programs that subsidize riparian reforestation.

This research was conducted by a multidisciplinary team of researchers and led by scientists from the Stroud Center. The study was funded jointly by the National Science Foundation and U.S. Environmental Protection Agency, and their findings, which were recently published in the prestigious "Proceedings of the National Academy of Sciences," have significant implications for a world that is facing a huge and growing freshwater crisis.

Students can learn about their environment and water quality at their own school.

Photo courtesy USDA NRCS.

An outdoor learning experience:

Waterspout gardens

Laura Downey
Executive Director, Kansas Association for Conservation and Environmental Education, Topeka, Kansas

Engaging students in real life explorations of their environment can make learning both motivating and meaningful. A new, hands-on activity guide is being developed that uses a waterspout garden to educate students and, at the same time, improve your community. The project, suitable for elementary, middle, and high school students, is in the latter stages of development and will meet Kansas State Core Curricular Standards in reading, writing, math, science, and social studies.

Every school has downspouts that collect water from roofs to send it out to the street, down storm drains, or over grassed areas around the school. This stormwater runoff is a relevant and real-life problem that students can explore and investigate. A waterspout garden is a planted area with a shallow indentation that collects and holds runoff before it reaches the storm drain. A local waterspout garden not only provides an outdoor learning space, but can be a community strategy to raise awareness about personal and community actions that can reduce runoff and the pollution it carries into local streams.

This project is being developed by the Kansas Association for Conservation and Environmental Education (KACEE) and Green Topeka (a project in Topeka, KS, through the city's Division of Water, Water Pollution Control, that utilizes green infrastructure as a method of addressing urban stormwater issues). Additional funding was provided in part by the USDA National Agroforestry Center and the U.S. Environmental Protection Agency.

Currently, KACEE and Green Topeka are offering a series of educational workshops targeted toward educators and neighborhood and community leaders, where participants will learn how to construct a waterspout garden and how to utilize it as a school and/or community educational resource.

We believe this is a unique piece of curriculum that not only provides a strong environmental education tool for teachers, but will involve students in addressing the stormwater and nonpoint-source pollution issues within their communities. The waterspout garden curriculum is also a great tool for developing outdoor learning sites at local schools that actively engage students in hands-on learning about water in their communities.

Educators and community leaders involved in the workshops taking place throughout 2005 will serve as field testers for the curriculum materials. When the field tests are complete, a final version of the curriculum will be made available through KACEE's Web site, *www.kacee.org*. The creators of waterspout garden curriculum would welcome additional field tests. If you are interested, contact Laura Downey (KACEE) at *ldowney@oznet.ksu.edu* or call 785–532–3322.

Waterspout garden =
planted area with a shallow indentation
that collects and holds runoff before it reaches the storm drain.

The Mississippi River Basin (MRB) covers 41 percent of the continental United States, and contains 47 percent of the nation's rural population. Contaminants from this entire area drain into the Gulf of Mexico through the Mississippi River. However, fewer than 11 percent of the polled residents of the MRB were even aware that problems exist in the gulf.

A river r

Riparian buffers in the

Rich Straight
NAC Lead Agroforester
Lincoln, Nebraska

It's one thing to clean up the water in a stock pond – a little fencing here and reestablish some grass around the pond's edge there. But, try scaling up that effort to improve water quality in a large reservoir, or in this case, the Gulf of Mexico. That's the goal of a recent international initiative called White Water to Blue Water (WW2BW). "White water" is a reference to snow melt and rain that flows across land and "blue water" refers to marine and coastal waters. You might wonder if the work you do in your county or district can affect water quality in something as large as the Gulf of Mexico. The answer is, yes! Over the years, individual activities on farms, ranches, and in towns have created a seasonal hypoxic zone (oxygen-depleted area caused by excessive nitrogen where normal populations of fish and shellfish cannot survive) the size of Massachusetts in the gulf at the mouth of the Mississippi River. Just as many individual land use actions caused the problem, those many individuals living within the Mississippi River Basin (MRB) are also the solution.

The problem

The mighty Mississippi originates as a tiny outlet stream from Lake Itasca in northern Minnesota. This tiny stream goes on to become one of the world's greatest river systems, draining all or parts of 31 States and 2,350 square miles before it finally reaches the Gulf of Mexico. More than 400 species of wildlife call the Mississippi their home, including some of the most ancient lineages of fish.

Each spring large quantities of nitrogen drain from the MRB into the Gulf of Mexico. This triggers a biological chain reaction that leads to a proliferation of algae. When the algae die off in the late summer, the microbes that decompose them consume the dissolved oxygen in the water. As hypoxic conditions occur when the oxygen content of the water is depleted, crabs and other slow-moving creatures are suffocated, while fish and shrimp try to escape to deeper waters or waters further offshore.

Sources of nitrogen in the MRB include agricultural fertilizers (31 percent), soil mineralization on croplands (31 percent), nitrogen-fixing legumes (21 percent), atmospheric deposition (7 percent), feedlot manure (6 percent), and municipal stormwater (1 percent). Not surprisingly, the majority of the nitrogen reaching the gulf has been determined to originate from agricultural lands. One of the reasons is that many of the streams flowing through croplands have little perennial vegetation along their banks. This allows much of the fertilizers, pesticides, and sediments to enter the streams unabated.

Unfortunately, the mouth of the MRB is not the only problem area in the Gulf of Mexico or in the Wider Caribbean for that matter. Other sources of water quality problems in the Caribbean include marine transportation and tourism along with agricultural activity in the many islands and countries that surround the Caribbean. The question then becomes how to coordinate a Caribbean-wide water quality effort?

The approach

The WW2BW partnership was announced in 2002 at the World Summit on Sustainable Development. This partnership is an international alliance of governments, organizations, financial institutions, nongovernmental organizations (NGOs), universities, and corporations seeking to integrate the management of watersheds, coasts, and oceans. The U.S.'s initial effort begins in the Wider Caribbean Region with 30 member countries. WW2BW is expected to protect and restore precious marine resources and will serve as a blueprint for future programs on watershed and marine ecosystem-based management in Africa and the South Pacific.

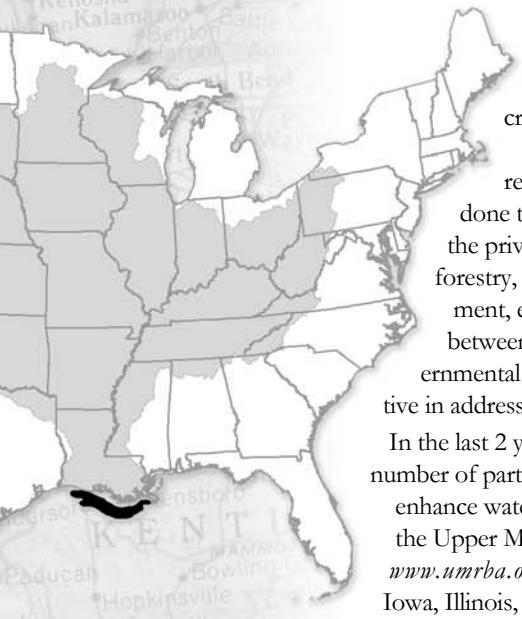
The National Oceanic Atmospheric Administration (NOAA) is the lead agency for the United States in the WW2BW effort. The NOAA Web site, *www.publicaffairs.noaa.gov/worldsummit/blueandwhitewaterdocument.html*,

uns to it

Mississippi River Basin

Mississippi River Basin

- 2,302 miles long
- Area of basin = 1.2 million square miles = $^1/_8$ of North America
- 12 million people live in the 1,256 counties and parishes that border the Mississippi
- 612,000 cubic feet per second of water is discharged into the gulf
- Provides habitat for 241 fish species, 27 mussel species, 45 amphibians, 50 mammals, and 40 percent of the Nation's migratory birds



lists three primary goals for the Caribbean effort. The first is "strengthening national and regional institutional capacity to implement cross-sectoral watershed and marine ecosystem management." This goal recognizes that much is already being done to improve water quality throughout the private and public sectors in agriculture, forestry, urban development, livestock management, etc. However, by coordinating efforts between private, local, State, and Federal governmental organizations we can be more effective in addressing common goals.

In the last 2 years there have been an increasing number of partnerships and initiatives created to enhance water-quality improvement. For example, the Upper Mississippi River Basin Association, *www.umrba.org*, was formed by the Governors of Iowa, Illinois, Minnesota, Missouri, and Wisconsin. This regional interstate program will help coordinate river-related programs and policies and facilitate efforts with Federal Agencies that have river responsibilities.

Another initiative called Green Lands, Blue Waters (GLBW), *www.greenlandsbluewaters.org*, is a long-term comprehensive effort whose mission is to support development of, and transition to, a new generation of agricultural systems in the MRB that integrate more perennial plants and other continuous living cover into the agricultural landscape. Agroforestry helps integrate perennial cover into agricultural systems.

Agroforestry's role

Increasingly, society expects agriculture and forestry to provide more than just products. Some level of social and environmental responsibility goes along with producing food and wood products. Agroforestry practices are productive systems that can help meet financial needs of the producer, as well as provide ecosystem services like clean air and water, wildlife habitat, and products. In fact, many agroforestry practices enhance water quality and are supported by landowner assistance programs in the Farm Bill.

The Gulf of Mexico hypoxic zone

The hypoxic zone, from the mouth of the Mississippi River to beyond the Texas border, is a seasonal phenomenon. It is commonly referred to as the Gulf of Mexico "Dead Zone," because oxygen levels within the zone are too low to support marine life. The Dead Zone was first recorded in the early 1970s. It originally occurred every 2 to 3 years, but now occurs annually. In the summer of 1999, the Dead Zone reached its peak, encompassing nearly 8,000 square miles off the coast of Louisiana.

Hypoxic conditions arise when dissolved oxygen levels in the water fall below 2 mg/L of water, too low to sustain animal life in the bottom strata of the ocean. The Dead Zone forms each spring as the Mississippi and Atchafalaya Rivers empty into the gulf, bringing nutrient-rich waters that form a layer of fresh water above the existing salt water. It lasts until late August or September when it is broken up by hurricanes or tropical storms.

The hypoxic zone is not only an environmental problem but also an economic one. Marine fisheries contribute more than $1 billion a year to Louisiana's economy. The fisheries are important both commercially and for recreation.

Riparian restoration

The Chesapeake Bay watershed's most successful initiative

Sally Claggett
Chesapeake Bay Program Coordinator,
USDA Forest Service
Annapolis, Maryland

Photo courtesy USDA NRCS

We've come a long way

In 1996 a Riparian Forest Buffer Initiative was launched to establish 2,010 miles of riparian forest buffers in the Chesapeake Bay basin. Despite initial doubt in both the ability to establish so many miles, and the benefit of this practice, this goal was met 8 years ahead of schedule. The success of the campaign is attributed to outstanding, collaborative efforts of Federal, State, local, and private agencies and groups. In 2003, a new goal was adopted upping the ante to 10,000 miles of buffers by the year 2010. Meeting this goal would mean that the 64,000-square-mile Chesapeake Bay watershed is on its way to having 70 percent of its riparian areas planted to forest buffers, trapping over 2.5 million pounds of nitrogen per year from flowing downstream to the bay.

An example to follow

The Chesapeake Bay is a national treasure. It is the largest estuary (body of water open at one end to the ocean) in North America and one of the most productive in the world. Literally hundreds of thousands of rivers, creeks, and streams comprise the Chesapeake Bay watershed. Because of its breadth, the watershed has a wide range of natural environments and climate. In addition to its abundance of natural diversity, it is home to more than 16 million people, with more arriving daily. The bay provides many important economic, recreational, and educational resources for those who live, work, and vacation throughout the region. Because of these pressures, the bay is ailing. Living resources essential to the bay's survival are in precipitous decline primarily due to nonpoint-source pollution.

The Riparian Forest Buffer Initiative is a part of the larger Chesapeake Bay Program, a multiagency partnership organization that has set a worldwide standard for watershed practices. The initiative works to control nonpoint-source pollution (nutrient and sediment runoff) in three primary ways: (1) conserving existing forests, (2) expanding urban and community tree canopies, and (3) restoring riparian forest buffers on rural land. In addition to managing nonpoint-source pollution, buffers also help sustain quality fisheries and aquatic habitat, provide terrestrial wildlife habitat, bank stability, recreation, and overall community well-being.

After almost a decade, support for the initiative has become nearly universal.

After almost a decade, support for the Chesapeake Bay Watershed Riparian Forest Buffer Initiative has become nearly universal, but challenges continue to mount. In order for the three primary bay States (Virginia, Maryland, and Pennsylvania) to meet the Total Maximum Daily Load nutrient and sediment reductions required by the Clean Water Act, they have recently identified a higher goal – 50,000 miles collectively (not just the current goal of 10,000 miles) of new forest buffers that need to be restored by the year 2010. This is part of their strategy to avoid regulatory action. The goal is staggering when one realizes the effort necessary, logistically and financially, to get even a single mile established. Already, an estimated $87 to $100 million has been spent since 1996. What's more, about 100 acres of forest in the watershed are lost per day, primarily to development. These forests are often associated with farm riparian areas that had been performing important water-quality functions. These need to be restored in order

to maintain the baseline upon which the 50,000-mile goal will be added.

The cleanup challenges are becoming harder to meet. Restoring buffer ecosystems requires investments in land rentals, pest protection, and substantial technical assistance. The most willing landowners have already signed up, so there needs to be improved outreach and education about the need for the ecosystem services provided by riparian forest buffers. The future of the bay still hangs in the balance. Its health is dependent on the choices made every day by the millions of people who live within the bay watershed.

To learn more about the Chesapeake Bay and the restoration efforts involved, visit *www.chesapeakebay.net*.

Keeping track of the miles

Many groups are involved in Chesapeake Bay forest buffer restoration efforts. Because of this, it has been difficult to track progress. In order to improve tracking, a Web-based tool that includes a quality assurance and quality control check was recently developed. The online tracking tool was first used during the 2005 season to document the extent of riparian forest buffer restoration taking place throughout the watershed. Each State has a contact person who verifies data being entered into the system. You can find the online tracking tool at *www.chesapeakebay.net/rfb*. Besides being widely available, the reporting is easy, and a popup mapping option makes the reporting more accurate.

Ascertaining a baseline of existing riparian forest buffers has posed an additional challenge. Knowing where riparian forests are being lost and at what rate is necessary in order to determine restoration needs and to analyze the benefits and targeting of future restoration. Satellite imagery (LandSat) is being used to assess existing buffers, but those working with the program have determined that it is not accurate enough to identify a sinuous forest of minimum buffering capacity. The next step will be to attain high-resolution imagery and analyze change in forest cover over time in a sampling of locations across the watershed.

Buffering Water and Wind

An intense rain engulfs farms in a flood
and the life of the crops flow away.
High dollar fertilizers wash toward the creek
and pesticides flush elsewhere this day.
The water grows mosses that choke out the fish
and youngsters can't go for a swim
in water that might just cause them some harm
on the outside or deep from within.

The breeze picks up and now is a gale
and the blasts rip and grab at the farm.
The soil is dislodging from where it belongs
and the dust will choke and do harm
to the people who live far from the site
where the grit has begun its long ride.
it'll settle into places that it doesn't belong
both on towns and the houses inside.

We have the technology and knowledge
to remedy this grave situation.
We plant landscape buffers to give some relief
and take away the inept aggravation.

The buffers can shield, absorb, and cushion
the forces that cause all the worry.
They can guard and protect people and things
and we certainly need to just hurry
and put in the windbreaks and streamside plants
that screen away the malfunctions
keep soil in its place, along creeks, in the field
and where farming and crops are the junction.

Giant plant pillows, the buffers can be
to protect people, belongings, and life.
They'll protect the land, water, and crops,
the children, the husband and wife.

So, cushion the wind and water and such
with the buffers we'll plant on the land.
and, we'll be better off, the economy will grow,
and life on the earth will be grand.

- Jerry (JB) Bratton, March 1998

It's true with real estate and now we know it's true with riparian forest buffers:

Location! Location! Location!

Mike Dosskey, PhD
NAC Research Riparian Ecologist
Lincoln, Nebraska

When you buy or sell a home or business its physical location, in part, determines its market value. It turns out that this is true with riparian buffers, too; where it's located in a watershed, in part, determines its conservation value.

Scientists at the USDA National Agroforestry Center, the University of Nebraska-Lincoln, and Iowa State University are developing a method to identify locations where buffers would work better, thereby contributing more to overall water quality.

It's simple. Buffers will have greater impact where they can: (1) intercept more runoff and (2) function better to trap pollutants in runoff before it can enter a stream.

The method enables anyone with a County soil survey map to compare different buffer locations to determine at which site(s) a buffer would work most efficiently. Soil surveys provide information on inherent landscape characteristics – soil type, slope, and water table depth – that determine field runoff generation and buffer trapping capability. For example, map units having lower-permeability soils or steeper slopes produce greater field runoff loads and have relatively poorer trapping characteristics.

Soil type is an excellent indicator of where to locate buffers for maximum efficiency.

Using parts of the Revised Universal Soil Loss Equation, calibrated using a process-based filter strip model, the scientists have produced a rating system called a Buffer Capability Index which can be used like a soil interpretation for water-quality buffers. The ratings enable comparison of different soil map units for capability of a buffer to trap sediment and dissolved pollutants from surface runoff. An additional rating, based on hydric indicators and water table depth, enable comparison of map units for the potential for buffers to interact with pollutants in groundwater.

In their test analysis, the scientists were able to compute ratings for all farmable soil map units in the Eastern United States based on a 12 m-wide grass buffer below a 200 m contour-cultivated field during a two-year rainfall event. The results have been mapped and show substantial differences in buffer capability across a small watershed, a State, and major land resource areas in the Eastern U.S.

The scientists are now developing interpretations based on the indexes that planners will be able to use to enhance the efficacy of buffer installations and buffer programs for water-quality improvement.

Location matters!

2005 Society of American Foresters (SAF) National Convention

Fort Worth, Texas
October 19–23, 2005

The agroforestry working group will be organizing two sessions at the SAF national convention this year. Both sessions are entitled "Agroforestry Options for Small Landowners."

For more information on the convention, visit the Society of American Foresters Web site at: *www.safnet.org/natcon-05/.*

Session I

- *Silvopasture options for small landowners*
  Dr. Kome Onokpise
  Florida A&M University
- *Forest farming*
  Dr. Charles Barden
  Kansas State University
- *Incorporating short-rotation willow biomass crops into agroforestry systems*
  Dr. Tim Volk
  SUNY Syracuse, New York
- *Alley cropping potential for small landowners*
  Dr. Mike Bannister
  University of Florida

Session II

- *Changing crops in Oregon's Grande Ronde Valley: growing hybrid poplar as an alternative*
  Paul Oester
  Oregon State University
  Extension Service
- *Changing how we define the forest products industry: NTFP enterprises in Southern U.S.*
  James Chamberlain
  USDA Forest Service
- *National training on conservation buffers: integrating and driving changes in agroforestry*
  Dr. Lyn Townsend
  NRCS, Oregon

Historical

continued from page 3

blizzards and bitterly cold temperatures threatened any warmblooded creature caught in the open. And, for Plains' grazers – bison, deer, pronghorns, and elk – the even slightly lower elevation of a stream bottom provided some shelter from the wintry blasts.

A sampling of quotes prior to 1900 indicates that substantial riparian trees were common:

1806 When Lt. Zebulon Montgomery Pike ascended the Arkansas River, he reported that "the river banks began to be entirely covered with woods on both sides" just west of the present Colorado border (Jackson, 1966, vol. 2, pp. 344-345). For about six miles upstream cottonwoods abounded.

1835 Henry Dodge wrote in 1835 that the Platte River above the heavily timbered Grand Island had abundant trees on the south bank while feeder ravines were "covered with timber of small growth." From a hill at the confluence of the North and South Platte, he could see the hills above the river downstream "covered with scattered groves" while at "an immense distance" were "the feathery outline of some tall trees... above the horizon." (Report of the Secretary of War, 1835)

1867 By 1867 the Union Pacific Railroad was building up the Platte valley. Businesses appeared to supply crews with wood for ties, although they had to reach far up tributary canyons to find any. One outfit had stacked thirty thousand cords for sale to the railroad and to nearby army posts. (Bratt, 1921, p. 146).

There were, essentially, three sequential but overlapping developments that help us understand what happened.

Indians and horses

The spread of horses out of the Southwest and the rise of the Plains' horse culture led to an increase in Native American population residing in the Plains. This, in turn, wore away at the resources of the river valleys. In 1821, Jacob Fowler estimated that a winter camp in the Big Timbers of the Arkansas hosted 20,000 horses; 27 years later an Indian agent reported Cheyenne and Sioux villages along 80 miles of the South Platte River. The amounts of wood cut and burned by these and smaller camps were considerable.

Westward migration and gold rush

The second development, the overland migration of white pioneers, took a much greater toll on some of the Plains' richest riverine woodlands. The losses were confined mostly to a few major streams – especially the Platte, including the North and South Platte, and the Arkansas – that offered level terrain for ox-drawn wagons as well as water, forage, and (for a while) fuel for cooking fires. While the Indians' use was concentrated in the winters, the overlanders swarmed up trails between February and July. It was a massive onslaught. Between 1840 and 1860 an estimated third of a million persons crossed the Plains en route to Oregon, California, and Utah, and tens of thousands more passed through on their way to Colorado and Montana from 1859 to 1865 stripping virtually all trees from the Platte valley.

Settlers

The third development, the advance of farming and stock-raising frontiers onto the Plains, compounded the effects of the first two. Between 1870 and 1880, 16 new counties were formed in central and western Kansas and several more in western Nebraska. The population of just 4 northwest Kansas counties increased in that decade from 91 persons to more than 41,000, about twice the peak population of Native Americans on the entire central Plains. Settlers gravitated to streams for basically the same reasons as Native Americans and overlanders, but unlike the two other groups, they lived there year-round. As the settler population expanded, farmers occupied all creeks that offered any significant timber. They did what they could to lessen their dependence on wood – sod houses and barbed wire fences are the best known adaptations – but for some needs, most importantly winter fuel, trees were an irresistible resource.

Nowadays, considerable interest exists in restoring riparian zones to reestablish "native" plant communities that can better provide a range of ecosystem services to manage water quality, flooding, and biodiversity. Trees and shrubs have been shown to play an important role in providing microclimate modifications and shading, streambank stabilization, inputs of organic litter and large woody debris to aquatic systems, water and nutrient run overcycling, wildlife habitat, and general food-web support for a wide range of aquatic and terrestrial organisms.

Fortunately, it is possible to piece together a history of land use in the Great Plains and reconstruct a picture of what riparian zones looked like and their condition. Natural resource restoration efforts that target "natural" condition need to use pre-1843 scenarios to accurately depict the natural state of riparian zones in the Great Plains. Although historical reference points do not necessarily instruct us in what to do, they can provide valuable insight as to what desired future conditions riparian restorations should strive toward.

Extracted from the Journal of Soil and Water Conservation*, E. West and G. Ruark, September/October 2004 (Volume 59, Number 5).*

Upcoming Events

September 14–15, 2005
Plains & Prairie Forestry Association 2005 Annual Meeting, "Plains Forestry Resource Development and Protection." Amarillo, TX. Contact: *www.nfs.unl.edu/ppfa.htm*.

October 5, 2005
Tri-State Living Snowfence Workshop. Spokane, WA. Contact: Megan O'Shea, 206–543–9744, *moshea@u.washington.edu*

October 17–20, 2005
4th National Small Farm Conference, "Creating Opportunities for Small Farmers and Ranchers." Greensboro, NC. Contact: Daniel Lyons, Sr., 336–334–7734, *daniell@ncat.edu. www.csrees.usda.gov/nea/ag_systems/in_focus/smallfarms_if_conferences.html*.

October 19–23, 2005
Society of American Foresters (SAF) National Convention. Fort Worth, TX. Contact: *www.safnet.org/natcon-05/*.

November 17-18, 2005
National Conference on Urban Ecosystems. Charlotte, NC. Contact: Donna Tschiffely, 703–904–7508, *donna@amfor.org*.

"Inside Agroforestry" is published quarterly by the USDA National Agroforestry Center.
Phone: 402–437–5178; Fax: 402–437–5712.

- **Greg Ruark**
  NAC Program Manager (256–372–4540)
- **Michele Schoeneberger**
  FS Research Lead (ext. 21)
- **Rich Straight**
  FS Lead Agroforester (ext. 24)
- **Kimberly Stuhr**
  Technology Transfer Specialist/
  "Inside Agroforestry" Editor (ext. 13)
- **Ryan Dee**
  Technology Transfer Assistant (ext. 14)

www.unl.edu/nac

Mission

The USDA National Agroforestry Center (NAC) is a partnership of the Forest Service (Research and Development and State and Private Forestry) and the Natural Resources Conservation Service. It is administered by the Forest Service, Southern Research Station; and its program manager and headquarters are located in Huntsville, AL, on the campus of Alabama A&M University, while its research, clearinghouse, and technology transfer staff are concentrated in Lincoln, NE, at the University of Nebraska. NAC's purpose is to accelerate the development and application of agroforestry technologies to attain more economically, environmentally, and socially sustainable land use systems. To accomplish its mission, NAC interacts with a national network of partners and cooperators to conduct research, develop technologies and tools, establish demonstrations, and provide useful information to natural resource professionals.

Address Service Requested

Official Business
Penalty for Private Use, $300

National Agroforestry Center
East Campus-UNL
Lincoln, NE 68583–0822

PRSRT STD
POSTAGE & FEES PAID
USDA — FS
PERMIT NO G-40

Inside Agroforestry | Summer 2005