Inside Agroforestry

USDA

Forest Service, Rocky Mountain Research Station
Natural Resources Conservation Service

SRWC's in Linear Plantings

"Short-rotation woody crops" (SRWC) are leading the way for agroforestry by changing attitudes about trees as a crop in Minnesota.

Short-rotation woody crops include trees like hybrid poplars and willows grown in block plantings for fuel and fiber. Beyond conventional block plantings, SRWC can be applied as strip plantings incorporated into agricultural production systems. This includes practices like windbreaks, riparian buffer strips, alley cropping, field borders, and wastewater treatment plantings.

Some of the factors encouraging the interest in SRWC in Minnesota include: 1) Minnesota's unique geographic location, where the forest and prairie meet; 2) its well-developed agriculture and forest-based industries and markets; 3) an impending shortage of aspen from natural forests; 4) socio-economic changes, particularly in the agricultural sector; 5) environmental degradation; 6) supportive policies; 7) a growing institutional framework to support agroforestry efforts, and 8) extensive on-going research support.

Nearly 30 years of intensive research and developement of fast-growing disease-resistant clones of hybrid poplar, has greatly aided the development of agroforestry in Minnesota. Landowners can now choose from seven widely available, reasonably dependable clones for outplanting.

A number of farmers in northwest Minnesota are now planting hybrid poplar in wide strips on riparian lands enrolled under the continuous CRP program. There is huge potential to improve the quality of the Minnesota River by planting riparian buffers with SRWC throughout the Minnesota River watershed. By combining SRWC into riparian buffers,

(See SRWC on page 7)

The Chesapeake Bay Program, How A Collaborative Approach Works

Al Todd, Chesapeake Bay Program Liaison

Albert Todd is a Forest Service Liaison for the Chesapeake Bay Program. He works for the Northeastern Area of the USDA Forest Service and manages the Forest Service's efforts within the Program, which is an intergovernmental/ interjurisdictional partnership. By profession he is a hydrologist/ ecologist and has spent most of his 18-year Forest Service career on watershed restoration. Following is an interview with Al.

What is the Chesapeake Bay Watershed Program (CBP) and what problems does it address?

AT: The Chesapeake Bay Program is a partnership of 14 federal agencies, states, and a variety of public and private interest groups. The Bay's watershed is about 64,000 square miles and includes portions of the states of Maryland, Pennsylvaina, Virginia, West Virginia, Delaware, New York, and the District of Columbia.

In 1983 an agreement, led by the Environmental Protection Agency (EPA), was signed among the bay states, which committed them to jointly cooperating to solve water quality problems associated with the bay. The program's real measure of success is the restoration of the bay, especially living resources. This includes fisheries, the crab population, and bay grasses. The root of the problem is nitrogen and phosphorous pollution, which is what spurred the EPA to take action.

How many partners are involved in the CBP and how important is a collaborative approach?

AT: The CBP is a state-driven program. But, federal agencies, like the Forest Service have an important role. They can provide money, technical expertise, and also a regional view that can be the glue to hold things together. There is an executive council that provides leadership and a variety of technical and management committies that help with the ongoing business of the program like setting goals, bringing science to the program, implementation across state lines, and bringing in advice from citizen groups and local governments, etc. Finally, many private nonprofit organizations provide time and labor.

The CBP definitely leverages a lot of resources. The beauty of a collaborative

(See CBP on page 6)

Inside This Issue

Message From the Manager

A commentary on the status of agroforestry as reported by Program Manager, Bill Rietveld

Waterbreaks

What do waterbreaks, levees, hybrid poplars, and agroforestry have in common? Answer: they can all be found on floodplains. This issue of *IA* focuses on the opportunities for agroforestry in riparian zones and floodplains. During the 1993 floods in the Midwest, a lot of attention was focused on the levee system along the Mississippi River and its tributaries — especially when they broke. Out of that major disaster, one of the lessons learned was that trees play many important roles on floodplains. Be sure to read the article by Doug Wallace in this issue which reports what they found out about trees and levees during the floods.

We are all aware that riparian zones and floodplains are critical areas in the landscape. They exist by nature's design to serve many functions -- retard flooding, filter water, harbor wildlife, and protect aquatic habitats -- but today a very high percentage of our riparian zones and floodplains have been converted to agriculture. Realistically, our challenge in dealing with problems on floodplains is not to convert those lands back to pre-settlement conditions, but to find ways to make them more resistant to flood damage and provide multiple benefits (including income) to the farmer and to the environment. Agroforestry practices can readily accomplish those objectives.

"Waterbreaks" on floodplains are designed like windbreaks, but their job is to intercept flood debris and slow down floodwaters, reducing the scouring action on croplands. Since floodplains are "home" to poplars, there are excellent opportunities to incorporate "short-rotation woody crops," i.e., hybrid poplars, as linear plantings into production agriculture systems. The article on page 1 of this issue discusses work being done in Minnesota to explore and develop these agroforestry opportunities.

These and other examples in this issue illustrate the opportunities for agroforestry and why it is so exciting. Frankly, that's what "keeps our batteries charged" here at the Agroforestry Center -- the opportunities for agroforestry are enormous!

On a personal note, this is my last issue of *IA* as NAC Program Manager. I retired in November and my wife, Janet, and I are moving to my home state of Colorado. My regrets in making my retirement decision are leaving agroforestry just as it is coming to fruition, and also losing the numerous personal ties with colleagues throughout the United States. In leaving, I want to express my "thanks" for your friendship and cooperation in working with me and supporting the Center over the years, and yes, I will still be thinking about agroforestry while I'm backpacking and skiing in Colorado. I look forward to hearing about your success stories.

Riparian Ecosystem Management Model Being Developed

General guidelines are currently available on the management of streamside areas for water quality control. However, information is lacking on just how these buffer zones should be designed to accommodate site-specific characteristics. Information is also lacking on how management alternatives may affect the water quality functions of the buffers.

To address this concern, the Riparian Ecosystem Management Model (REMM), a computer program, is being developed by the Agricultural Research Service (ARS) to assist natural resource professionals design riparian buffers. REMM simulates hydrology, nutrient dynamics, erosion/ sedimentation, and plant growth in riparian areas.

Besides its use by researchers to better understand the interaction of ecosystem components, REMM is intended for use by planners as a decision-making tool to assist in the effective management of riparian zones.

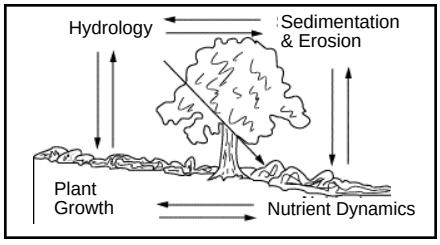
REMM will help users analyze design and management alternatives to achieve desired results. Some of the design and management alternatives may consist of the width of buffer zones, types of vegetation in each buffer zone, fertilization, tillage, and harvesting impacts.

REMM will then allow users to estimate the following results, based on site condition, climate, and management inputs: surface and subsurface nitrogen and phosphorus loads into the stream, sediment loads into the stream, vegetation growth in the buffer system, amounts of water and nutrient uptake by vegetation, denitrification losses from the buffer system, amounts of sedimentation and erosion in the buffer system, and mineralization and immobilization of nutrients.

REMM will provide users with important information for the management of effective riparian buffer systems.

REMM is expected to be out by July, 1998. Upon its release, training will be provided to key NRCS personnel and other conservation partners.

For more information, contact Jim Robinson, Southeastern Area Agroforester, Ft. Worth, TX at 817-334-5232 ext. 3624 or Lyn Townsend, Forest Ecologist at the NRCS Watershed Institute, Seattle, WA at 206-616-8414.



REMM analyzes management options and how the riparian zone is influenced or impacts various environmental conditions.

Give the Floodplain a Break — A Waterbreak

by Doug Wallace, State Staff Forester, NRCS, Columbia, Missouri

"Floodplain management strategies should not be concerned with how to control flooding but rather on how to work with flooding."

——Doug Wallace

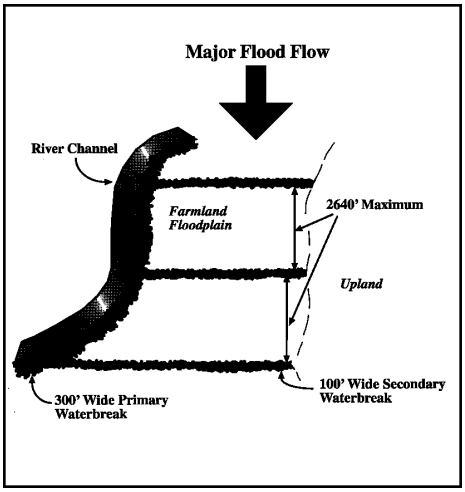


Figure 1 — Simplified waterbreak layout designed to reduce flooding damage to farmland.

Try to picture a typical floodplain setting in the Midwest today and you're likely to conjure up fields of corn, soybeans, milo, and wheat, nonexistent or narrow corridors of trees, and scattered farmsteads all protected by an elaborate (and expensive) network of levees.

Obviously, from an historical perspective the natural ecosystems on floodplains have been highly altered. Whether it's for the good or bad continues to be debated. Certainly the Great Midwest Flood of 1993, and to a lesser extent the Missouri River flood of 1995, showed that even with the best available floodplain management techniques, when the Missouri River decides to flood - it will, and with devastating consequences.

Recognizing this, floodplain management strategies should not be concerned with *how to control* flooding but rather on *how to work with* flooding. Clearly, from a social and an economic standpoint, allowing the floodplain to revert to a completely natural state would be a radical and largely unpopular option. However, creating a floodplain agricultural system that accommodates flooding but still maintains its economic and biological attributes could be a supportable option.

A key natural element in this latter option, long overlooked and currently deficient in the Midwest floodplain landscape, is simply trees - *planned trees.*

Four major flood events have occurred along the Missouri River in the last 40 years. Estimated costs of reclaiming flood damaged farmlands range from $25/acre to over $3000/acre. Damage evaluations and on site observations from the 1993 Midwest flood estimated that fields protected with tree corridors experienced 25 percent to 75 percent lower reclamation costs. In light of this, damage to flooded landscapes could be significantly reduced if "waterbreaks" (bands of trees in the floodplain to ameliorate flooding damage - similar in principle to windbreaks on upland sites) were established or maintained along river corridors and within floodplains.

Mature waterbreaks would provide many benefits to floodplain agricultural ecosystems. During flood events, properly designed waterbreaks would trap debris, reduce sand deposition and scouring within interior crop fields, create a more uniform distribution of sand and silt, protect levees, divert flow currents, and reduce damage to roads, ditches and farmsteads. During non-flooded conditions, waterbreaks would increase wildlife habitat, improve water quality by trapping eroding sediments and field chemicals, and provide additional farm income from the sale of wood products.

A typical waterbreak system *(see figure 1)* would include primary waterbreaks that parallel major river courses in corridor widths of at least 300 feet. Secondary or interior waterbreaks of 100 feet in width could be established along field borders or every half mile, whichever is less, perpendicular to anticipated major flood currents. Additional interior waterbreaks could be strategically planted to divert potentially damaging flood currents away from sensitive areas.

While initially appearing to be a costly option, waterbreaks are economical, based solely on the reduction of cropland reclamation costs, assuming major floods

(See Waterbreak on page 7)

Scouring, sand deposition and levee damage from 1993 flood. Notice intact levee adjacent to wide woody corridor.

Essential Buffers Provide Economic Benefits

Rarely do you find a landowner who incorporates such a large number of diverse agricultural practices onto his farm to increase economic gain, research new technologies, and benefit the environment.

This privately-owned, diversified agricultural business, Mt. Jefferson Farms near Salem, Oregon, is a unique company that specializes in putting research to work in the fields, resulting in the production of valuable crops. And, agroforestry plays a leading role in this success.

Rob Miller, owner of Mt. Jefferson Farms, Inc., has implemented the use of agroforestry practices into the company's production plan in several ways. A tour of the farm first finds the use of riparian forest buffers to stabilize streambanks and filter pollutants.

"There are a lot of streams and rivers that run throughout the property," Miller said. "We installed the riparian forest buffers out of necessity." Based on research and years of trials, Miller believes that the tree-based buffers actually accomplish the intended tasks better than artificial buffers. "We think riparian forest buffers in a well-thought-out design,, coupled with technical assistance and bioengineering, they can provide us with a natural system that will do a better job than the rock systems that have been used in the past," Miller said.

In an effort to benefit financially from these riparian areas Miller has designed his riparian forest buffer in such a way that portions of the buffer can be harvested. This intensive system, which has been established on Mt. Jefferson Farms since about 1975, produces a valuable cash crop when the rows of poplars and willows are harvested. The products include cuttings used for specialty nursery and bioengineering erosion control uses and logs for traditional forest products.

"We've found that if we use trees in the riparian buffer that produce profitable wood, we can help the environment *and* make a profit," Miller said. "We can make this system pay for itself."

Hybrid poplar logs, planted in 1980, are being harvested from a riparian area to be used for veneer.

Miller explained that they try to use native trees near the banks of the streams and rivers because, "that land belongs to the river," while the more profitable, faster-growing hybrids are adjacent to the farmland.

Miller has found that harvesting the trees for biomass does not reduce the effectiveness of the buffer. "Even after cutting, the roots act as an anchor for the soil while still giving us a pretty intense crop," Miller said.

Extensive research is performed at Mt. Jefferson Farms. This allows Miller to improve his innovative ideas, while at the same time reaping the benefits. Their nursery research has selected the best native trees and the fastest-growing, most-profitable hybrids for use in agricultural systems on their farm.

Miller explains, "Our experience in a riparian forest buffer situation - with no fertilizers, irrigation, weed control or other extraordinary agricultural practices being used -- is that the natives grow about three to five feet per year in height with an annual diameter of between 3/4 of an inch to one inch. The hybrids grow between four to seven feet per year and have an annual diameter increase between one to two inches.

"The hybrid poplars grow almost twice as fast as the native species, which provides excellent economic benefits," Miller said. "But we are very careful to use trees that will fit the needs of the soil."

Most landowners are concerned about the costs involved with riparian plantings and the time investment it takes to see the economic and environmental benefits. As a businessman, Miller faced these concerns too.

"Many folks have asked me about sustainability in these systems," Miller said. "We are happy to say that we have achieved a high level of sustained wood harvest from the 15- to 18-year-old buffers without decreasing the effectiveness of the buffers.

"Sustainablility is a broad word in our systems in that many of our alley cropping plantings are planted initially on very close spacings (one foot by one foot apart) and then a thinning program follows. We actually reach a sustained harvest level the very first year," Miller said. " This is because we are taking off salable production cuttings at the end of the first year that we use to supply our very large forest company contracts for planting stock, and also various bioengineering products that we use ourselves or sell into the marketplace for erosion control purposes."

In addition to innovative uses of agroforestry like the riparian zone/hybrid poplar system, Mt. Jefferson Farms is home to an experimental alley cropping system. Miller is growing tea bushes in the shade provided by rows of poplars within the buffers. Miller explains that the system has been a success so far and they hope to continue experimenting.

It is evident that Miller has found a reasonable balance of economic and ecological benefits on Mt. Jefferson Farms through the use of agroforestry practices. He says he enjoys helping the environment while growing a profitable crop and reaping additional benefits for wildlife habitat.

National Conservation Buffers Technology Conference 1998

January 26-28, 1998 • San Antonio, Texas

This national conference will synthesize the state of the science behind the design, installation, and maintenance of conservation buffers for agricultural lands.

"Conservation buffers provide many practical and lasting benefits," says John Hebblethwaite, Conservation Technology Information Center (CTIC) Executive Director, "these include protecting the soil, improving air and water quality, enhancing fish and wildlife habitat, as well as adding beauty to the landscape."

The conference, co-sponsored by the CTIC, USDA Natural Resources Conservation Service, USDA Forest Service, and other partners in the National Conservation Buffer Initiative. The conference will feature leading researchers, educators, practitioners, and producers who will address a wide array of subjects related to conservation buffer practices and systems.

Conference attendees will include agribusiness representatives, agricultural and environmental organizations, agricultural consultants and advisors, consumer groups, farmers, ranchers, local, state and federal program managers, technical and communication specialists, policymakers, the media, and others.

For more information or to receive a copy of the agenda, contact Lyn Kirschner at 765-494-1827 or e-mail at kirschner@ctic.purdue.edu. The agenda and registration material is available on the CTIC web site at http://www.ctic.purdue.edu/

CTIC is a nonprofit information/data transfer center, located in West Lafayette, IN, that promotes environmentally and economically beneficial natural resource systems.

Announcing the North American Conference on Enterprise Development Through Agroforestry: Farming the Agroforest for Specialty Products

October 4 - 7, 1998 • Minneapolis, Minnesota

Increasing numbers of landowners and farmers across North America are interested in the emerging agroforestry practice of "forest farming" -- the intentional culture of valuable special products in agroforestry practices. Producing specialty products in agroforestry practices can increase and diversify income, increase wildlife, diversify farms and landscapes, and create new opportunities for small limited resource farms, while protecting soil and water resources.

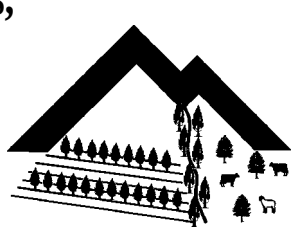
This conference will provide participants an opportunity to learn and share experiences about "cultivating" specialty products in temperate agroforestry systems. There will be special emphasis on markets and marketing, production systems, and financial and environmental costs and benefits.

Sessions will focus on three major areas of special products *intentionally* produced through forest farming: 1) botanicals and medicinals; 2) decorative and handicraft products; and 3) food products (including nuts, herbs, oils, mushrooms, fruits, flavor and smokewoods, etc.).

The conference is sponsored by NAC, CINRAM, AFTA, USDA-FS State & Private Forestry, Minnesota Department of Natural Resources, Minnesota Agroforestry Coalition, Minnesota Institute for Sustainable Agriculture, and the Center for Alternative Plant and Animal Products, U of MN.

For more information on the workshop agenda or presenting posters and practictitioner displays and exhibits, contact: Scott Josiah, 612-624-7418.

Agroforestry: Integrating Conservation, Crops, Livestock, and Trees in the Pacific Northwest



May 12 & 13, 1998, Richland, Washington
May 14 & 15, 1998, Portland, Oregon

For more information, contact:

Gary Kuhn, NAC Western Representative, 206-616-7166, e-mail: kuhn@geology.washington.edu
Beverly Gonyea, University of Washington Conference Coordinator, 206-543-0867, e-mail: gonyea@u.washington.edu
Don Hanley, Washington State University Extension Forester, 206-685-4960, e-mail: dhanley@u.washington.edu

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National Agroforestry Center • NRCS • USFS Region 6 • Washington State University • University of Washington • CH2M Hill • Association for Temperate Agroforestry • Oregon State University, Cooperative Extension Service

(CBP from page 1)

approach is that everyone unites to solve common problems, and we all bring something unique to the table.

The CBP has been around for almost 15 years and it continually comes up as one of the most successful, long-term collaborative partnerships of its kind. It has gone from a bunch of people uniting around common pollution problems to almost an institutionalized cooperative to solve those problems

Where does agroforestry fit into this program? What have been the barriers and the rewards?

AT: One of the things we found is that our traditional forestry focus was on lands where forest management was already occurring. But where we had great potential for rehabilitating the bay was to look at restoring forests within areas that are not primarily forested, especially in our agricultural landscape. One of our key missions is to find a better marriage between traditional forestry and agriculture, and obviously agroforestry is a perfect match.

Riparian forest buffers are the primary agroforestry practice that we focus on. They present a very promising and useful tool in terms of nutrient removal, which is our big focus for the bay. In addition they provide multiple benefits by helping to restore fisheries and stream systems, as well as provide wildlife corridors. I like to describe the Cheseapeake Bay as a heart, and the stream systems and riparian areas as the circulatory system connected to the heart. The health of the circulatory system plays a big role in the health of the heart itself.

One barrier was gaining acceptance of the scientific merits of riparian buffers within state agencies and the regulatory community. Often times it is tough for researchers to look at a multiple objective practice with a variety of benefits. Research tends to focus on an individual function rather than system functions. So, any given buffer may accomplish one goal well and another poorly. The real value is looking at the composite of things that it accomplishes.

A major barrier is changing landowner attitudes. In 1992 we took a hard look at how to get riparian forest buffers integrated into normal conservation practices around the watershed. We have resistance from the farming community because this is a new practice and requires "permanently" taking crop or pasture land out of production. Its a challenge to get landowners to think of the land being in a different kind of production, which they are not used to.

In reality the barriers are different for different landowners and economics is almost always a barrier. Although we've shown in analyses that often landowners don't really lose money by installing riparian buffers, many don't really make money either. They must have a basic committment to want to improve the stream.

The education process is important to increase their knowledge about making important choices about the other benefits on their land — including wildife, water quality,aesthetics, fisheries etc. — and to many that is enough. First we faced the institutional barriers and now we're working to overcome landowner barriers.

From your experience, what is needed to get landowners to adopt riparian forest buffers?

AT: Like any new practice, part of getting landowners to adopt a new practice is related to education and outreach to dispell some of the myth and perceived problems that may exist. Right now we're working on a brochure called *The Top 10 Questions About Planting a Riparian Forest Buffer.* We're trying to help answer some of the typically-asked landowner questions about cost, taking land out of production, what riparian buffers do for them, what they do for stream management, etc. We need to answer these questions so they can make decisions based on reality versus perception. It is essential that they feel comfortable with the decision that they are making.

The next thing that you need to do is provide a good range of incentives. Some people just need the education, encouragement, or technical help. Others require the right kind of financial incentives. We're trying to make sure that riparian buffers get specific incentive programs targeted for them. But, we also want to integrate the practice in with a variety of other conservation programs -- the conservation toolbox kind of approach -- using a variety of programs to address a need. A lot of programs don't integrate riparian buffers.

Next we need to make sure that we are transferring the technology and information to field professionals. We are trying to do a lot of that with technology transfer materials and training that we're putting together. Many professionals don't understand riparian forest buffers or how they might use them.

Finally, we need to begin to start engaging private, nonprofit groups in this initiative. This includes wildlife, fish, and watershed organizations. In Pennsylvania, for example, we're working with the nonprofit, privately funded Riparian Tree Trust to generate private funds to provide small grants to landowners and community groups to plant and restore riparian forest buffers. Government programs are often complicated or not coordinated. We need to begin to coordinate and streamline these so the landowners aren't confused about the requirements. They want it simple. Complexity scares them away.

How have the riparian buffers helped the water quality problem and what do you see in the future regarding the Chesapeake Bay?

AT: We have monitoring and scientific studies on individual sites that can demonstrate substantial water quality and habitat improvements. How it's helped the overall problem for the Chesapeake Bay is much harder to answer because there are so many influences. Separating out the effects of one practice is hard. Another factor is that we haven't been working on restoration for that long.

We do have good data that show naturally protected streams are healthy. But, we don't have much experience with restoring riparian environments and then evaluating the improvement in water quality and fisheries habitat on a watershed scale. Really, the science related to riparian buffer function has only been around for less than 15 years. Efforts to restore riparian buffers on any large scale have only been around for the last three to five years. So, many of those trees are just starting to grow.

We have one project in Maryland this year that will complete the establishment of riparian forest buffers on the entire length of the Little Gunpowder Falls

(CBP from page 6)

River. So maybe in another five to ten years we will be able to start saying something about improving water quality on this river.

We're in this for the long-term and need to communicate this to people involved. We're in the business of restoring living, dynamic ecosystems as a buffer and filter for adjacent land uses. We have to put an investment into this now, but the payoff is long-term.

We've made some commitments for the future of the Chesapeake Bay. We plan to restore 2010 miles of riparian forest buffers by the year 2010 - a very aggressive effort. We'll be focusing a lot on education, developing new incentive programs, working on tax strategies, and building partnerships to get the work done. We plan to do it farm by farm and community by community.

What can others learn from your efforts, especially when a collaborative approach is implemented?

AT: I would say the first thing is to get your science in order and make sure you know what you're talking about. You won't have all of the answers but you need to bring together a good technical and scientific foundation to be able to move forward. Be inclusive and invite people to be a part of the process. There is no doubt in my mind that the collaborative approach is the only way to be successful. You won't always end up where you wanted to go, and you won't always get everything you wanted, but I've found that over time getting there is part of the reward.

Incremental progress is something to be proud of because progress doesn't always come in leaps and bounds. Changing people's attitudes about how they steward the land is a long- term commitment and you have to stay at it.

Public information and involvement is what gets things done. Set aggressive, reachable goals. Keep people reaching for something. Do a lot of outreach. Over the last few years I've given about 100 presentations to groups all over the watershed.

Be adaptable and flexible. Realize that where you thought you were going may not be where you end up. And you have to be ok with changing your focus, as long as you're still heading towards your goals.

(SRWC from page 1)

farmers can protect surface waters from surface and subsurface contamination by soil and agricultural chemical and fertilizers, and also generate income from the sale of the trees (hybrid poplar) for energy or fiber. Thus, they feel that they are not taking land out of production, but are putting it into a different kind of crop production.

Interest in timberbelts is also increasing. A timberbelt looks like a wide windbreak. Two innovative farmers in southwest Minnesota are planning to install a total of 115 acres of timberbelts planted to hybrid poplar and other woody species (for wildlife). These will be harvested in 10-12 years for the pulp market, and in the meantime will provide crop protection from wind and prevent soil erosion across the two farms. A second or third coppice rotation are possible, considerably reducing costs.

The Center for Integrated Natural Resources and Agricultural Management (CINRAM) is currently working with the National Agroforestry Center to evaluate the economic viability of using SRWC in linear agroforestry systems (windbreaks, timberbelts, riparian buffers) across the United States. This national assessment will show whether this makes financial sense to the farmer (can trees compete with annual crops), and provide input on the value of environmental services (e.g. clean water) provided to the public by riparian buffers established on private lands, which is an important policy question.

Despite these positive trends, more needs to be done. Markets and market information need to be strengthened and improved. The economic and financial benefits of a range of agroforestry practices need to be clarified and publicized to key decision makers in the agricultural sector. We need to assess the impacts of policies (local, state, and national) on agroforestry adoption, and improve upon them where necessary. And, we need to continue to forge partnerships for effective and coordinated action.

Adapted from "The Dynamic Emergence of Agroforestry Opportunities in Minnesota" by Scott Josiah, CINRAM, St. Paul, MN.

(Waterbreak from page 3)

of a 10 year frequency (the current average). In addition, research has found that levees protected with woody corridors between the levee and the river had a significantly lower failure rate, and as the width of the woody corridor increased the severity of levee failure decreased.

The strategic use of trees in floodplain agricultural ecosystems is an important key in mitigating flooding damage. Restoring trees to these systems would add economic stability, provide protection, increase habitat diversity, and compliment traditional agricultural systems.

Tree Species for Midwestern Floodplains

Midwest floodplain sites can support a wide variety of tree species. Selection should be based on which species are capable of growing on the site, the availability of planting stock, resource protection needs, and landowner objectives. A minimum of three different species should be planted in the waterbreaks to reduce insect and disease risks and improve wildlife benefits. Some suggested tree species for floodplain sites in the Midwest include:

- Eastern cottonwood
- American sycamore
- green ash
- silver maple
- swamp white oak
- red maple
- pecan
- bur oak
- bald cypress
- black willow
- pin oak
- hackberry

Watch for

Agroforestry Notes

on Short Rotation

Woody Crops.

...Coming Soon...

Upcoming Events

January 26-28, 1998
Conservation Buffers Technology Conference, San Antonio, TX. Contact Lyn Kirschner, 765-494-1827.

May 12-13 and 14-15, 1998
Agroforestry: Integrating Conservation, Crops, Livestock, and Trees in the Pacific Northwest, (12-13) Richland, WA and (14-15) Portland, OR. Contact Gary Kuhn, 206-616-7166

October 4-7, 1998
North American Conference on Enterprise Development Through Agroforestry: Farming the Forest & Agroforest for Specialty Products, Minneapolis, MN. Contact, Scott Josiah, 612-624-7418.

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Michele Schoeneberger, Research Program Leader and Soil Scientist, ext. 21
Jerry Bratton, FS Lead Agroforester, ext. 24
Bruce Wight, NRCS Lead Agroforester, ext. 36
Kim Isaacson, *IA* Editor, Technology Transfer Specialist, ext. 13
Clover Shelton, Technology Transfer Assistant, ext. 14
Jim Robinson, NRCS Agroforester located at Fort Worth, TX; phone: 817-334-5232, ext. 3624
Gary Kuhn, NRCS Agroforester located at Seattle, WA; phone: 206-616-7166

Mission

The National Agroforestry Center (NAC) is a partnership of the USDA Forest Service and the USDA Natural Resources Conservation Service.The Center'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, the Center 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.

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