

MANY PATHS TO SUCCESS

VIRGINIA IS FOR LOVERS — AND SILVOPASTURE

COLLEEN ROSSIER
PROGRAM ASSISTANT USDA
OFFICE OF THE CHIEF SCIENTIST
WASHINGTON, D.C.

turn his knowledge into action by managing land in the most beneficial way possible.

TURNING A VISION INTO A REALITY

Seven years ago, in order to make this dream a reality, Chris began converting a 250-acre loblolly pine plantation in Scottsville, VA, into a goat and sheep silvopasture system that resembles a pine savanna landscape. Since that time, he and friends have spent many weekends away from their graduate school studies and daily lives to thin and prune trees by hand, conduct controlled burns, fight invasives, and experiment

Throughout his life, Chris Fields-Johnson has been keenly aware of the need to preserve the natural landscapes he cherishes and that provide us with clean air to breathe, water to drink, and food to eat. As a graduate student of soil science at Virginia Tech, a forestry undergraduate, a student of Tom Brown Jr.'s Tracker School, and a former employee of the Virginia Department of Forestry, he also knows about the science behind soil restoration and forestry. This has given him a strong desire to

Inside



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NAC Director's Corner

A commentary on the status of agroforestry by Andy Mason, NAC Director



Adoption of Agroforestry – its takes four “Ps”

Thinking back over my 3+ years as NAC Director, I am once again asking myself, “What does it take to increase adoption of agroforestry?” We strive for this desired outcome: Thousands of producers across America are using agroforestry, increasing their profitability, and providing a wide range of public benefits/services for their community and nation. To realize this outcome, we need the four “Ps” -- more Peer-to-peer learning, Professionals, Partnerships, and Programs all working together!

Peer-to-peer learning

We all know producers who have adopted agroforestry practices. We need to identify more producers in more counties and find ways to get them CONNECTED (i.e., peer to peer), with other producers who are not currently practicing agroforestry. Depending on local custom/culture, this may include good old workshops, visits to on-farm demonstration sites, and even social media tools.

Professionals

It is very important to have professionals with agroforestry EXPERTISE who can provide the technical, educational, and marketing assistance requested by landowners, Tribes, communities and others. Second best is to have professionals who can immediately refer a producer to someone else who has agroforestry expertise.

Partnerships

Partnerships at the local, state, regional, national, and international level have clearly shown me their importance in bringing together people to increase awareness and understanding of agroforestry and how it can support landowner objectives as well as community and watershed goals. Examples of regional agroforestry partnerships include the Chesapeake Bay Agroforestry Team (see p. 11) and the Mid-American Agroforestry Working Group.

Programs

USDA and other state/local programs certainly have an important role in advancing the adoption of agroforestry. You may not know about a new agroforestry question in the Census of Agriculture, thanks to the USDA National Agricultural Statistics Service (NASS), which will help us learn who practices agroforestry across the US and also guide future outreach and assistance efforts.

I'm interested to hear your thoughts about the four “Ps”.

Please also let me know if there are ways NAC can help you advance the science, practice, and application of agroforestry. Please email me at amason@fs.fed.us.

Sincerely,
Andy Mason

What's New

13th North American Agroforestry Conference

The 13th North American Agroforestry Conference will be held June 19-21, 2013 on behalf of the Association of Temperate Agroforestry (AFTA) <http://aftaweb.org/>. AFTA is a non-profit association that promotes the understanding of agroforestry in a North American context. This biennial conference will be hosted at the University of Prince Edward Island in Charlottetown, Prince Edward Island, Canada.

The conference will consist of two days of plenary and concurrent sessions (June 19 and June 21) that will address many aspects of agroforestry. A conference field tour of agroforestry in the Charlottetown area will occur on June 20. Participants who register for the pre-conference tour on June 17-18, will also visit agroforestry sites in New Brunswick.

Paper and Poster abstracts will be accepted until March 30, 2013. The official language of the conference is English. All oral and poster presentations will be presented in English.

For more information go to www.2013NAAC.com



with forage establishment while they also learn how to raise goats and sheep. Chris and his friends are early adopters of this agroforestry system in Virginia and thus have much to learn on their own. Some of the things they are learning are the technical aspects of how to establish forages, how far apart to thin the trees, how many animals can graze per acre, how quickly to rotate the pastures, how to restore nutrients that have been extracted from the soil. Most importantly, they are learning how to finance the operation.

Other farmers in the area—both beginning ones like Chris as well as more seasoned ones—are facing similar issues. Some wish to start silvopasturing their lands to decrease heat stress in the summer by providing shade for their animals, while others are interested in diversifying their assets by combining the long-term income streams from the trees with the short-term income stream from goats or cattle. Others are interested in the environmental benefits that trees provide and wish to keep them on large tracts of their property while still producing animals. Without many mature silvopasture operations in the area, however, trying something new often seems risky for producers because it brings with it much uncertainty.

READY ASSISTANCE TO EARLY ADOPTERS

This risk and uncertainty is why it is critical for USDA's Natural Resources Conservation Service (NRCS), US Forest Service, and partners (including technical service providers, Cooperative Extension, and state agricultural and forestry agencies) to be able to provide technical advice and financial assistance to help farmers and ranchers make the leap to this new technology and way of doing things. Fortunately for farmers in Virginia, NRCS listened to the desires of producers in the area, and as of October 2011, they adopted a

silvopasture establishment practice applicable throughout the state.

What is silvopasture? How can I establish it on my land? How should I manage my trees? How can I establish forage for my animals as efficiently and effectively as possible? What type of rotation scheme do I need for my animals?

This means that NRCS employees may now provide both technical and financial assistance to help producers establish silvopastoral systems on their land.

This is a major step forward for the adoption of silvopasture systems in Virginia and demonstrates one of the three goals of the USDA Agroforestry Strategic Framework: that of integrating agroforestry into the USDA toolbox. For this to happen, "silvopasture establishment" first had to be established as a practice standard at the national level, which occurred

in 2002. Then, the NRCS state office in Virginia reached out to J.B. Daniel, a grassland agronomist and grazing specialist who works in Farmville, and asked him whether the practice was appropriate for the state of Virginia. J.B. had met with a variety of landowners in various counties throughout Virginia over the last few years, so he knew that, yes, silvopasture was certainly a desirable practice that some producers are interested in, and one that NRCS would do well to support. To assist NRCS employees as they help landowners establish silvopastures, the NRCS created a "Job Sheet" based off of the national guidelines, which gives an overview about the types of decisions landowners need to address as they convert plantations or pastures into silvopastures.

TAKING AGROFORESTRY ON THE ROAD

Mr. Daniel went one step further and organized a working field trip to several farms. The farms were in varying stages of silvopasture establishment: from a producer with early interest and large property holdings to another who is integrating poultry, but is still in the planning stages, to a high school

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The field trip provided lots of opportunities for questions and discussion. -

Source: Colleen Rossier

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teacher interested in converting land for educational purposes, to Chris Fields-Johnson and his business partner, Daniel Michaelson, who have already started managing the trees but have not yet moved their animals onto the property.

Though it started out small, interest in this trip grew until it included employees from nearby county offices of NRCS and Virginia Department of Forestry (which administers the forestry aspects of NRCS conservation programs), NRCS experts from their technology support center in North Carolina, professors from Virginia Tech and Virginia State Universities. At each site, J.B. led a discussion focused on how to help each producer meet their goals by drawing from the varying expertise of the attendees.

After learning about resources available to assist them on the tour, Fields-Johnson and Michaelson have

followed up with their local forester, and they plan to pursue assistance from the Environmental Quality Incentives Program. They also hope to establish partnerships with researchers, professors, and extension specialists who might wish to use the farm as a research and demonstration plot, which is a great need as: 1) on the research side, there is much left to discover about the best ways to implement silvopasture practices in Virginia and 2) on the extension side, as mentioned above, many producers will only try new practices once they see a fellow producer doing it.

EXPERTS SHARE EXPERTISE

The beauty of this quick trip was that the discussion not only benefitted each producer by helping them initiate a plan with their county District Conservationist but it was educational for all. Each expert learned about another expert's field of study: the foresters learned

what would be needed for forage establishment in a silvopastoral system while the forage specialists learned how to calculate basal area and how to identify the dominant trees to retain when thinning a timber stand.

While this was a fantastic example of how USDA is starting to integrate agroforestry into the way it does business, there is much left to be done: more state NRCS offices still need to adopt agroforestry practices; more educational opportunities such as this one must be available for government employees, researchers, and producers to better understand these transformational systems; and more research must be done to learn the best ways to establish and manage silvopasture systems. Way to go, Virginia! 🌱

Shade Coffee Production Enjoys Resurgence

RICHARD STRAIGHT
ADAPTED FROM NRCS FACT SHEET,
MANAGING SHADE COFFEE, NOV 2012



Coffee flowering under the shade of plantain in Puerto Rico - Source: NAC

Shade coffee production in Puerto Rico has experienced a resurgence during recent years, after undergoing a dramatic period of deforestation to convert to coffee production under full sun. The revival of shade coffee production utilizes a combination of coffee shrubs and shade trees that form a secondary forest. Shade coffee production has been proven to provide environmental benefits such as soil erosion control, water quality and quantity improvement, and wildlife habitat. Shade coffee production also provides socioeconomic benefits such as the opportunity to develop other sustainable forest products, and the reintroduction of traditional jobs and cultural activities for local coffee pickers.

The coffee growing zone in Puerto Rico is located mostly in the humid mountains of the west-central section of the "Cordillera Central." This area is characterized by steep, mountainous topography and a cool climate in the humid and wet subtropical forest. The coffee tree or shrub originated in Ethiopia. The most common species grown in Puerto Rico are the *Coffea arabica* and *Coffea canephora*. According to Don José S. Alegría, coffee trees from the Dominican

Republic were introduced to Puerto Rico in the town of Coamo in 1736. Coffee rapidly became Puerto Rico's most important export product, with 50 million pounds exported annually by the end of the 19th century. Currently, about 82% of the coffee planted in Puerto Rico is arabica.

COFFEE SHRUBS UNDER SHADE

Coffee shrubs require certain environmental conditions to perform at their best in terms of vigor, growth and berry production. These conditions are achieved by planting coffee in locations with the most suitable environmental conditions. In Puerto Rico, not all coffee plantations may be located in areas that are ecologically suitable for coffee growth. Therefore, recreating favorable coffee growing conditions may be beneficial for both coffee production and for the environment.

For example, the optimum growth temperature for arabica coffee varies from 60° to 65° F. With these conditions, coffee shrubs grow adequately, developing vigorous and healthy branches and leaves. The temperature in Puerto Rico's coffee zone fluctuates between 55° to 85° F. One method to maintain ideal coffee-growing temperatures is to manage shade on the plantation. Healthy coffee plantations also require adequate moisture, in terms of both rainfall and relative humidity. Coffee shrubs require 70 to 100 inches of rain per year and a relative humidity of 70 to 85%. Shade trees help to reduce potential evapotranspiration by modifying solar radiation. The amount of solar light in shade coffee plantations can be managed by pruning shade trees.

A FAVORABLE ENVIRONMENT

- **Soils:** Trees provide valuable soil erosion control. Roots anchor soil particles in place and the canopy intercepts raindrops, reducing their erosive impact on the soil below. Leaf litter and other organic matter accumulates on the soil surface as mulch and is slowly incorporated into the soil, providing habitat for beneficial organisms.
- **Water:** The formation of a secondary forest by shade grown coffee helps increase water retention in the soil profile, benefitting base flow and helping to recharge aquifers. Trees improve water quality by helping to reduce soil erosion and storm water runoff, thereby reducing sediments and other potential contaminants dissolved in storm water.
- **Air:** Planting shade trees reduces wind speed in the coffee groves, benefiting pollinators and wildlife and reducing potential wind damage to coffee shrub roots.
- **Plants:** Development of tree strata (creating layers of branches) improves tree health and wildlife habitat.

Shade coffee production also provides socioeconomic benefits such as the opportunity to develop other sustainable forest products, and the reintroduction of traditional jobs and cultural activities for local coffee pickers.

Planting leguminous trees also provides nutrients to the soil.

- **Animals:** Shade coffee production creates wildlife habitat that may benefit endemic and threatened species.
- **Energy:** Shade trees moderate the temperature on the coffee plantation, improving plant health, cooling buildings and providing a better working environment for farm laborers.

Shade is not necessary in every ecosystem. Each farm must be evaluated to determine the practices and management methods needed to produce the best coffee and meet other landowner objectives. Other conservation practices suitable for coffee plantations are: planting along the contour, trails, vegetative barriers, pruning, nutrient management, integrated pest management, ecological pulping equipment, and waste management.

FOR MORE INFORMATION

Please contact the NRCS Field Offices or the State Office in San Juan, Puerto Rico, at 787-766-5206, or visit our Web site at: www.pr.nrcs.usda.gov. 🌱



Coffee and plantain provide a protective canopy at the top of the watershed that creates habitat and reduces erosion. - Source: NAC

Silvopasture and Fuel Breaks

BRUCE WIGHT
NRCS NATIONAL FORESTER
RETIRED

The Allen Edwards family tree farm near Colfax, CA has been in the family for more than 60 years. “When my father bought the property, it was essentially cut-over railroad land, largely covered with weed oaks and brush, but with scattered large conifers and fair conifer reproduction, mostly Douglas-fir, under the oaks and brush,” Allen writes in a 2002 Forest Landowner article. During the first 50 years of ownership the Edwards family operated the tree farm part-time. When Allen retired, the tree farm became a full-time enterprise with a number of improvements including timber stand improvement.

This landscape is prone to seasonal wildfires. Allen was well aware of the fire risks due to the topography of the American River Canyon nearby. With assistance from the Natural Resources Conservation Service, Allen treated about ten acres of his forest along a ridge with a shaded fuel break. A fuel break is a strip or block of land on which the vegetation and woody debris is modified to reduce the risk of fire crossing the strip or block of land. Allen removed underbrush and thinned trees in a strip about 400 feet wide along the ridge at a cost of \$4500.

His forethought and investment proved critical in 2001 when a fire broke out in the adjoining canyon. Although Allen lost some of his forest, the fuel break provided a critical line of defense for the firefighters attacking the fire. The fuel break slowed the fire and sheltered the firefighters enabling them to stop the fire from going down the other side toward the community of Colfax.

With his loss of trees from the fire, Allen began exploring additional farm enterprises to supplement his cash flow so he was not dependent solely on the wood. His diversification included purchasing some Kiko and Boer goats for meat. The goats not only provide another farm product but they also have a key role in reducing fire risk. Once a fuel break is established by thinning the trees and reducing the underbrush, the work does not stop there.

Keeping the fuel loads down is a continuous process. That is where the goats come into play. Through managed grazing, the goats browse the leaves and twigs of the shrubs including young live oak trees and ceanothus shrubs reducing the fuel loads. Edwards commented, “I did mechanically what I expect these guys to do biologically.” This is more cost effective because the goats are also providing a cash meat product. Improved air quality is also a benefit not only due to less wildfire risks, but there is also less need for prescribed burns to reduce the fuel loads. Prescribed burning can be expensive and complicated including all the effort to meet burn permit and smoke management requirements.

Allen uses a rotational grazing system with his goats. They will graze about a six acre paddock at a time. When they complete one paddock, they are moved to another area. Allen indicated that the ceanothus shrub that he called “sweet birch” has about 20 percent protein helping produce a high grade meat. He has about 40 goats that are protected by Great Pyrenees guard dogs due to predators like mountain lions, bears and coyotes.

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Agroforestry and Forest Restoration in Pennsylvania

TRACEY COULTER
WATERSHED COORDINATOR, PA DCNR
BUREAU OF FORESTRY
HARRISBURG, PA

The 2010 Executive Order for Strategy for Protecting and Restoring the Chesapeake Bay Watershed includes developing a plan to maximize forest restoration in priority areas by 2012. Forest restoration includes lands with agroforestry potential. Because Pennsylvania contributes half of the freshwater flowing into the Chesapeake Bay, its land uses play a significant role in the Bay’s overall water quality.

Today, forests comprise about 60 percent of the land cover in Pennsylvania. Its non-forested land base is largely agricultural. Despite the predominance of these land uses, agroforestry—the integration of trees and agriculture—is poorly understood and generally not considered by landowners or practitioners in stewardship planning. The landscape in Pennsylvania provides ample opportunities to explore the additional potential agroforestry practices provide in the Bay toolbox of best management practices.

LAND OWNERSHIP AND FOREST DISTRIBUTION

About 70 percent of the 17 million acres of forest land in Pennsylvania is privately owned. An estimated 20

percent of those private forest lands occur on farms but are not generally well integrated into farming operations. A recent Penn State University (PSU) study of farmers and forest land owners found “that agroforestry could satisfy specific land management objectives within diverse populations” (Strong and Jacobson 2005). Furthermore, the plurality (36 percent) of respondents expressed interest in producing non-timber forest products or forest farming. One in four respondents indicated interest in practices to enhance livestock production, such as silvopasture, windbreaks, and riparian forest buffers. Nearly one-third of the respondents were interested in agroforestry practices that complemented timber management, including crop-tree management and forest farming. But perhaps the most relevant statistic for technical service providers and resource professionals was that 90 percent of the respondents would consider adopting agroforestry if information were made available and if they could see working demonstrations.

Statistics from the 2007 Census of Agriculture indicate that, while the number of farms in Pennsylvania is holding steady, the size of the average Pennsylvania farm decreased by 9 acres between 2004 and 2007. Today the average Pennsylvania farm is 123 acres in size, while 38 percent of Pennsylvania farms are less than 50 acres. New farmers are facing farmland prices ranging from \$3,000 to \$7,000 per acre. As farm size shrinks and the cost of farmland rises, farmers are increasingly looking to glean more productivity from their land holdings, including their forest land.

INTRODUCING AGROFORESTRY

With the support of the US Forest Service, the Pennsylvania Department of Conservation and Natural Resources (DCNR) Bureau of Forestry and its partners have



Jim Finley, Penn State University, discusses canopy management in agroforestry systems. - Source: Tracey Coulter

reached out to the agricultural community by providing agroforestry training, promoting forest-based income streams to farmers, and collaborating with educators and farmers to develop agroforestry demonstration sites. This partnership includes the USDA’s National Resource Conservation Service (NRCS) and Agricultural Research Service (ARS), Dickinson College, Pennsylvania Association for Sustainable Agriculture (PASA), Cornell University Cooperative Extension, and PSU’s Shaver’s Creek Environmental Center and Department of Ecosystem Science and Management.

Pennsylvania’s forestry community has a long-standing relationship with PASA, which leads forest-based workshops at the organization’s annual conference and seasonal workshops. The annual PASA conference held in early February attracts more than 2,000 farmers and other supporters of sustainable agriculture. By virtue of their hands-on involvement in farming practices, farmers that participate in these workshops are perceived to be more inclined towards active stewardship of their forest land, than other Pennsylvania farmers.

WOODLAND PASTURING AND FOREST HEALTH

Because of this perceived inclination toward active forest stewardship, the Bureau of Forestry and its partners have sought to engage this community in a “farm forest” conversation. This partnership has reached several hundred workshop participants with information on the basics of forest farming (e.g., for ramps, ginseng, and mushrooms), chainsaw safety, silviculture, nut production, charcoal production, working with consulting foresters, and silvopasture practices. Of all the subjects, silvopasture discussions garner the most interest among participants and the most consternation among foresters.

In years past, Pennsylvania farmers traditionally pastured livestock in their woodlands, even driving them up into the mountains to feed on acorns and chestnuts. However, for over 100 years, foresters have lectured (and been lectured) on the havoc livestock causes in forest communities. In the end, foresters and farmers have generally avoided conversations about silvopasture. Nonetheless, the practice of woodlands pasturing has continued, often in ways that destroy forest regeneration and leaves bare soil devoid of suitable forage,

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resulting in increased run-off and land of little value as either forest or pasture. Realizing this, some landowners are looking to foresters and other resource professionals to guide them in maximizing productivity while protecting natural resources.

The forestry community was largely unprepared to participate in this evolving dialogue. One Chester County grazer sought assistance from a local DCNR Service Forester, who in turn referred him to a consulting forester. The farmer gave each forester a copy of J. Russell Smith's *Tree Crops* as required reading before silvopasture planning could begin on his farm. Foresters generally are not well versed in pasture development; fortunately, an NRCS grazing specialist joined the team, and the collaborative effort may provide one of Pennsylvania's first on-farm silvopasture demonstration sites.

A DEMONSTRATION SITE FOR AGROFORESTRY PRACTICES

Noting there was no single location where a suite of agroforestry practices could be viewed in Pennsylvania, the DNCR Bureau of Forestry reached out to the Dickinson College Farm in Boiling Springs, Cumberland County, to develop an agroforestry demonstration center. Dickinson College Farm is a 180-acre working farm that provides vegetables to the College's dining hall, a local food bank, and members of the farm's co-op. In addition to raising vegetables, herbs, and flowers for sale, the College Farm manages small flocks of sheep and laying hens. The farm is also used to demonstrate farming practices.

In 2011, the College Farm received a grant through the Chesapeake Bay Program Forest Working Group to demonstrate five principle agroforestry practices. Then, in summer of 2012, student interns

supervised by the farm manager and other faculty members, collected baseline data for the planned agroforestry demonstration sites to document vegetation change as agroforestry practices develop.

Agroforestry is an emerging conversation in Pennsylvania. There are many practitioners, from the Adams County farmer alley cropping pumpkins in his apple orchards to a Bedford County shiitake grower to a Jefferson County ginseng farmer and the Lancaster County silvopasturist. It is almost certain that few of them would recognize themselves as agroforesters. Here new partnerships are being formed as resource agencies, nongovernmental organizations, and colleges and universities are working with farmers across traditional land use boundaries to develop working landscapes, learning from and teaching each other as they go. 🌱

Shelterbelts, Beef Producers' Behaviour, and Farming Practices:

Using Social Marketing to Promote Change

BETTY KELLY, PROJECT LEAD
DR. BILL ASHTON, DIRECTOR
RURAL DEVELOPMENT INSTITUTE
BRANDON UNIVERSITY
BRANDON, MANITOBA

Social marketing and the Internet are new tools in efforts to promote the use of shelterbelts for beef production in southwest Manitoba. Shelterbelts provide a number of benefits for farmers, including important ecological functions, by sequestering carbon while still leaving the majority of the land in agricultural production.

As well as a number of other soil and water benefits, shelterbelts provide livestock protection from the cold winter winds. The reduced wind velocities greatly reduce the effect of cold temperatures on livestock, lowering animal stress and energy requirements.

Beef producers also achieve significant environmental and financial benefits by using shelterbelts to support swath and bale grazing. Feeding the cattle directly on the pasture where they spread their own manure also results in large gains in nutrient capture. While not new to the industry, planting shelterbelts to support field/bale grazing is an unfamiliar farming practice that requires livestock producers to change their established way of farming.

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Is Allen's combined timber and grazing system a form of silvopasture? It may not meet all the parameters of silvopasture, but it is an intentional and integrated system including dual management of the understory vegetation through grazing while at the same time managing the overstory for a long term timber product on the same land unit. His system is also interactive by manipulating the biological and physical interactions between the tree, crop and animal components. The intensity of the operation may not be as great as some silvopasture systems where

additional annual inputs, e.g., as fertilizer, are included, but the results look a lot like silvopasture.

Agroforestry comes in many sizes and shapes and may not always adhere to very strict definitions. For Allen Edwards, his tree and goat farm is a diverse enterprise that is protecting the natural resource base and providing his family an economic return. Allen calls his form of management "highland farming," or "stacking enterprises" with the goal of every piece of ground being productive. If he and other small landowners can make a living from their land through

diverse enterprises, there may be less selling of land for subdivisions. "Personally, I want to figure out a way that I can keep one or both of my kids around here, because I like my kids," says Edwards. "But broader than that, I just don't want to see all this land ripped up by subdivisions."

(Note: article was adapted from "California Tree Farmers of the Year 2002" - http://www.caltreefarm.com/ca_tree_farm_wards/2002.html and "Allen Edwards: Goat Browsing", http://ucanr.org/sites/rreal/Land_Stewards/Goat_Browsing/, University of California Renewable Resources Extension Act Program) 🌱

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The Rural Development Institute (RDI) at Brandon University in Brandon, Manitoba, is investigating the attitudes of beef producers toward, and their adoption of, this environmentally responsible cropping and winter livestock feeding method, using alternating rows of planted trees and grazing fields.

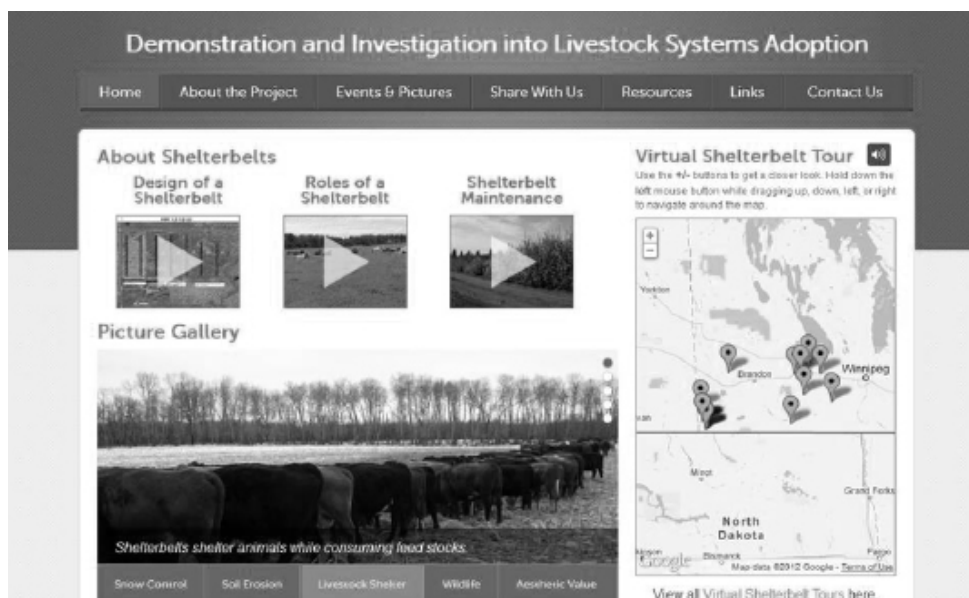
CHANGING LONG-ESTABLISHED FARMING PRACTICES

Funded under Agriculture and Agri-Food Canada's (AAFC) agricultural greenhouse gases program and spearheaded by Upper Assiniboine River Conservation District (UARCD) and RDI, this applied research project is exploring ways to increase the use of shelterbelts by Manitoba's beef producers. With two interrelated but distinct components, this four-year project addresses important environmental and behaviour changes.

First, the project aims to better understand beef producers attitudes toward farming, their perceptions of shelterbelts, and what incentives are needed to bring about voluntary changes in farming practices. In conjunction with a hands-on educational awareness component led by UARCD, a social marketing research component at

RDI is conducting a multi-year study of the attitudes of beef producers. The project then will apply a staged, multifaceted awareness and information effort geared to raise beef producers' awareness of shelterbelt benefits and increase their willingness to adopt the use of shelterbelts as part of their cropping and winter feed strategy—i.e., accept a commitment to change their farming practices.

It is not the intention of the project to invent new farming methods but rather to demonstrate that unfamiliar practices such as alley cropping, when combined with proven



An interactive web site allows producer to share their experiences.

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winter feeding strategies, can benefit both the beef producer's bottom line and the environment.

However, there has been limited uptake by Manitoba beef producers. The project's social marketing model provides a structure for determining why this is the case. As the project continues, the model will also provide a structure to evaluate strategies that are successful and why: i.e., which project activities actually encourage beef farmers to change their practices and increase the use of shelterbelts in their winter feeding operations.

THE SOCIAL MARKETING APPROACH

A synthesis of behaviour change models, coupled with previous experience and informed efforts of others, resulted in the formulation of a five-stage social marketing model to implement the goals of this project:

- Awareness: inform beef producers of the importance and benefits of shelterbelts.
- Assessment: allow beef producers to evaluate barriers, costs, and opportunities of shelterbelts for their cattle operations.
- Acceptance: prompt beef producers to decide whether or not to implement shelterbelts: i.e., answer Yes, No, or Maybe.
- Action: monitor those saying Yes in their efforts to rejuvenate and establish shelterbelts; assist those answering Maybe to decide on a Yes or No response; and explore why a No response has been given and what, if anything, can turn it to a Yes.
- Appraisal: record beef producers' assessments of return on investment in field conversion to shelterbelts.

Key aspects of the project strategies include maintaining a field site for demonstrating alley grazing, creating a website that includes video clips of fellow beef producers talking about the importance of shelterbelts and bale grazing to their farm operation, and holding shelterbelt design workshops. An annual baseline survey of primary awareness and interest was conducted involving over 300 beef producers, which provided key data for the social marketing model. The information gathered by the baseline survey assists in planning appropriate awareness messages for the website and promotional activities at beef producer tradeshow events.

AWARENESS

The UARCD is working directly with a local beef producer, Doug Caldwell near Kenton, Manitoba, to establish a quarter-section alley cropping and winter feeding demonstration site. In addition to consulting on the layout and assisting with planting the trees, UARCD will regularly monitor the site for wind velocities, animal and crop performance, and nutrient cycling in both the treatment and nontreatment areas, including changes in soil characteristics.

The interactive website (<http://prairieshelterbelts.ca/>) contains short video clips of existing shelterbelts and invites beef producers to take virtual tours to see 16 of their peers talking about the important role that shelterbelts and winter grazing play in their farming operations. Grounded in the belief that people are more likely to be influenced by others like themselves sharing their experiences, the video clips of the sites provide that peer connection. One click on an interactive map and a viewer is in a beef producer's living room or touring his cattle feeding program.

ASSESSMENT

Integrated with the demonstration site and the website are shelterbelt design workshops offered by the regional conservation districts, AAFC, and RDI. Up to 40 beef producers were invited to these hands-on workshops in the winter of 2012–2013, where they were invited to design new and expanded shelterbelts based on aerial photos of their own land. Producers can also assess the costs and benefits of shelterbelts for their operations; determine the number, types, and costs of trees and bushes necessary to create them; and identify the nearest source of seedlings.

ACCEPTANCE AND ACTION

After designing and assessing the related costs and benefits of shelterbelts, beef producers are given time to assess the value of pursuing their preferred design before making an implementation decision (Yes, No, or Maybe). Each workshop participant will receive follow-up calls to answer any remaining questions about the process and help identify specific considerations in order to reach a decision on implementation. The beef producers who do move to action with a Yes, will become 'local champions', and by their example, they will assist with sustaining change in favor of shelterbelts. These champions will be profiled on the website in the coming year.

APPRAISAL

Now in year two, this project is beginning an ongoing appraisal process. The collaborators continue to play unique and interrelated roles in helping the project accomplish its objectives.

RESULTS TO DATE

Analysis of first year primary data from baseline surveys completed by 231 Manitoba beef producers offers important information about

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beef producers, including their reasons for using shelterbelts and their perceptions on the use of, and benefits of, shelterbelts. For example, 68 percent of producers with shelterbelts strongly agreed that shelterbelts increase livestock protection, compared to 52 percent of the producers without shelterbelts.

A current challenge facing the project is how to best identify beef producers who are moving from the awareness to the assessment stage; and how to motivate them to participate in one of the workshops. Local advertising and personal invitations are proving the most effective to date, but inclement weather, location and timing are still barriers to full attendance. To address this, additional workshops are being considered for later in the winter.

FUTURE PLANS

As the project moves into year 2 and continues to work toward the long term goal of increased commitment to shelterbelts, these initial findings will give valuable direction to the project awareness and social marketing activities. The differences between the producers with and without shelterbelts will be tracked over the coming years to inform additional content for the website as well as the workshops. Ongoing data will also provide further information on the overall effectiveness of the project in promoting behavior change and the project's effectiveness in motivating beef producers in southern Manitoba to increase their use of shelterbelts.

This project is being implemented by UARCD (project proponent) in collaboration with: Manitoba Agriculture, Food and Rural Initiatives (MAFRI); Agri-Environment Services Branch

(AESB) of AAFC; Manitoba Agro Woodlot Program(MAWP); Manitoba Beef Producers (MBP); Manitoba Forage Council (MFC); and RDI.

Each of the collaborators is excited about the anticipated long term results:

- increased commitment to shelterbelts,
- reduced greenhouse gases from livestock production,
- a proven social marketing model that will inform future agricultural behaviour change projects.

For more information about this project contact: Ryan Canart, Upper Assiniboine River Conservation District, at uarcd@mts.net, or Dr. Ashton, Director, RDI, Brandon University, at ashtonw@brandonu.ca. To visit the website and keep up to date on project activities, go to <http://prairieshelterbelts.ca/>. †

A Strategy for Agroforestry in the Chesapeake Bay Watershed

JULIE MAWHORTER
USFS NATURAL RESOURCE PLANNER
CHESAPEAKE BAY PROGRAM

TOM WARD
FORESTER EAST NATIONAL
TECHNOLOGY SUPPORT CENTER
NRCS

Farms and forests play a vital role in the economic, social and ecological landscape of the Chesapeake Bay watershed. Approximately 22 percent of the watershed—or 9 million acres—is given to agricultural land use. An additional 4.2 million acres of woodlands are part of farms in the watershed. The future viability of these working lands is threatened by high rates of land conversion and development.

Retaining sustainable rural landscapes and economies must be at the heart of watershed protection and restoration efforts. The application of conservation practices by farmers is critical to reducing the runoff of nutrients and sediment into local waterways.

The 2010 Executive Order entitled “A Strategy for Protecting and Restoring the Chesapeake Bay Watershed” calls for federal agencies to “develop a Chesapeake Bay watershed strategy to maximize forest restoration in priority areas, including: residential land...; areas covered by community tree canopy...; gaps in core wildlife habitat;...abandoned mine land...; and agroforestry areas.” Teams were formed with expertise from across the watershed to develop content for the five strategy areas: *agroforestry, contaminated lands, mine lands, urban and community trees and wildlife habitat.*

The Agroforestry Team consists of representatives from federal agencies (USDA Natural Resource Conservation
See team page 12

From team page 11

Service [NRCS] and Forest Service); universities (Cornell University, Penn State University, and Virginia Tech); and state agencies (West Virginia, Virginia, Maryland, and Pennsylvania). The Agroforestry Strategy focuses on using trees in strategic and innovative ways to benefit farms and the Bay.

WHY AGROFORESTRY?

Agroforestry is the intentional mixing of trees and shrubs into crop and animal production systems to create environmental, economic and social benefits. Agroforestry practices bring together the ecological advantages of trees and other woody plants and the economic benefits associated with their products. By incorporating trees into agricultural landscapes Chesapeake Bay farmers can add environmental and economic buffers to their farming enterprise. By adopting agroforestry practices in wooded areas, landowners can receive an additional income stream that will help retain tree cover.

The USDA Agroforestry Strategic Framework (FY2011-2016) states that agroforestry practices:

- Provide protection for valuable topsoil, livestock, crops, and wildlife
- Increase productivity of agricultural and horticultural crops
- Reduce inputs of energy and chemicals
- Improve water quality
- Diversify local economies

AGROFORESTRY, WHERE?

Agroforestry practices can be applied throughout the watershed to provide benefits to landowners and the Bay. Landowner outreach, technical assistance, and incentives for agroforestry will be focused in areas of greatest need and opportunity. NRCS has selected priority watersheds in which to focus supplemental cost-share funding for voluntary conservation practices through the Chesapeake Bay Watershed Initiative. These priority watersheds represent areas with the highest runoff of nutrients and sediment to the Bay. Implementation of riparian forest buffers and other agroforestry practices will be focused in these areas to accelerate Bay restoration efforts.

AGROFORESTRY, HOW?

State forestry agencies in Maryland and Virginia are working with partners to apply GIS-based targeting of buffers at the county scale. These analysis tools identify areas where forest buffers are most needed and yield the greatest water quality benefits. The results help to guide outreach and technical assistance to landowners who are interested in incentive programs.

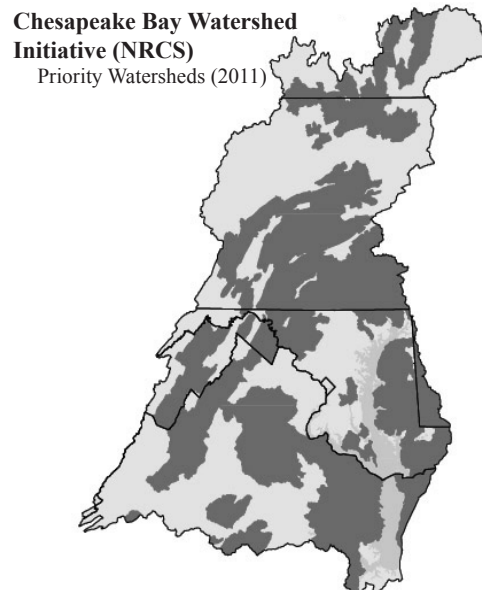
Implementation of other agroforestry practices, such as windbreaks, silvopasture, alley cropping, and forest

farming, will depend largely on farm characteristics and landowner goals. Counties with a high concentration of pasture land provide a good starting place for silvopasture education and demonstrations. Areas with high poultry production are a good place to promote windbreaks, or “vegetative environmental buffers,” to manage air emissions and odors.

Financial assistance to establish agroforestry practices is available from NRCS through Farm Bill programs such as the Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, and Conservation Stewardship Program. Cost-share and rental payments to establish riparian forest buffers are available through the Conservation Reserve Enhancement Program and Conservation Reserve Program, administered by USDA Farm Services Agency. Available incentives vary by state; information can be found online and at local USDA Service Centers. In some areas, state and local programs may also be available to provide assistance for agroforestry practices.

Technical assistance for installation of agroforestry practices is available from NRCS, state forestry agencies, consulting foresters, and local Soil and Water Conservation Districts.

FOCUS ON PENNSYLVANIA



Priority watersheds for Chesapeake Bay Watershed Initiative agricultural cost-share funding (FY2011).

Source: NRCS

Although cost-share assistance for forest buffers and tree/shrub establishment has long been available, the term “agroforestry” and some of its practices are still

See **buffers** page 15

NATIONAL AGROFORESTRY CENTER UPDATE 2012

A PARTNERSHIP OF THE FOREST SERVICE AND NATURAL RESOURCES CONSERVATION SERVICE

The USDA National Agroforestry Center (NAC) Update highlights annual accomplishments of NAC products, programs and research. For a complete summary of NAC 2012 accomplishments and activities or for more information visit nac.unl.edu or contact the Center at 402-437-5178 extension 4011.

Technology Transfer

NEW WORKING TREES INFO SERIES

NAC developed a new informational series, *Working Trees Info* in a one-page format and released six additions in 2012. They are “What is alley cropping?”, “What is a windbreak?”, “What is a riparian forest buffer?”, “What is agroforestry?” and “What are agroforestry’s income opportunities?” and “What is Forest Farming?”

TWO NEW NAC TECHNICAL NOTES

NAC has developed and distributed two new agroforestry technical notes: AF Note – 43, “H: The Human Consideration in the Adoption of Agroforestry”; and AF Note – #37, “Pine Straw – a Profitable Agroforestry Enterprise”. Downloadable PDF issues are available at <http://nac.unl.edu/agroforestrynotes.htm>

PROFITABLE FARMS AND WOODLANDS, NEW RELEASE, A PRACTICAL AGROFORESTRY GUIDE FOR LANDOWNERS, FARMERS AND RANCHERS

The guide was developed by a team of agroforestry specialists from the 1890 and 1862 Land Grant Universities, led by the 1890 Agroforestry Consortium in close cooperation with NAC. The guide depicts step-by-step methods and principles on developing agroforestry practices for the purpose of enhancing the economic and environmental benefits of their farms, ranches and woodlands.

GREAT PLAINS WINDBREAK INNOVATION/RENOVATION WORKSHOP

NAC partnered with the Agriculture and Agri-Food Canada, Agroforestry Development Centre and numerous NRCS, Conservation District and State Forestry partners to hold an international conference on windbreak renovation & innovation at the International Peace Garden, July 24-26. There were 120 participants, 85 on site and 35 online. Several follow-on workshops have been held and planned including a Southern Great Plains Renovation Conference in Dodge City, KS on May 21-23.

6TH NATIONAL SMALL FARM CONFERENCE

Rich Straight, FS Technology Transfer Lead, was invited to make a presentation at the conference in Memphis, TN. The presentation on opportunities in agroforestry for small farms was well attended as were the agroforestry stops on the conference field tour. NAC also hosted an exhibit at the September conference.

TRIBAL STUDENT INTERN IN WISCONSIN

During the summer of 2012, the USDA National Agroforestry Center (NAC), the FS Office of Tribal Relations and the Chequamegon-Nicolet National Forest jointly sponsored Cody Westlund, a FS Tribal student intern who was stationed at the Forest Service’s North Great Lakes Visitor Center near Ashland, WI. Cody is from the Red Cliff Tribe and a student at the University of Wisconsin majoring in Game Design and Development with an art focus. With training and guidance from NAC, Cody worked closely with conservation agencies, local Tribes, and extension specialists to create visual simulations of agroforestry and conservation practices. Cody used *CanVis*, visual simulation software developed by NAC, to create a catalog of regionally relevant images that depict properly designed and located conservation practices.

AGROFORESTRY MEMORANDUM OF UNDERSTANDING APPROVED BY USDA AND AGRICULTURE AND AGRI-FOOD CANADA

The new memorandum, signed in April 2012, will facilitate expanded cooperation between the USDA National Agroforestry Center and Canada’s Agroforestry Development Centre (ADC) to collaborate on research and development, including the advancement of agroforestry science and tools for climate change mitigation and adaptation in temperate North America. The collaborative work of the two centers will also support the Global Research Alliance on Agriculture Greenhouse Gases.

Research

JOURNAL OF SOIL AND WATER CONSERVATION FEATURE PAPER

A paper authored by Forest Service and Ag Canada scientists, “Branching Out: Agroforestry as a Climate Change Mitigation & Adaptation Tool for Agriculture” was an invited feature paper for a special journal issue focused on conservation practices to mitigate GHG emissions in the Journal of Soil and Water Conservation’s September/October 2012 issue. Michele Schoeneberger and Gary Bentrup, NAC scientists were the lead authors. A presentation of the article can be view at <https://docs.google.com/file/d/0ByUmVw1Cqz5gblRYekNPc3NtNTg/edit?pli=1>.

JOURNAL OF FORESTRY COVER ARTICLE AND COMMENTARY

“A Role for Agroforestry in Forest Restoration in the Lower Mississippi Alluvial Valley” was the cover story in the Journal of Forestry’s January/February 2012 issue. The article explores agroforestry options and their potential to provide both profits for farmers and restore important functions and values of bottomland hardwood forests in a region where about two-thirds of the original forest has been cleared and converted to agriculture. The article was co-authored by Forest Service R&D scientists Mike Dosskey, Gary Bentrup, and Michele Schoeneberger at the USDA National Agroforestry Center. Andy Mason, NAC Director, helped lead the writing of a commentary for the December 2012 Journal of Forestry “Advancing Agroforestry through Certification of Agroforesters: Should the Society of American Foresters Have a Role?”

FOREST FARMING NETWORKS

Research Forest Products Technologist Jim Chamberlain is leading NAC’s work with colleagues at the University of Georgia, Virginia Tech, and the Catawba Sustainability Center to establish long-term research plots. He is working with a local forest farming network to demonstrate the viability of native plants as an alternative income source, learning to understand how to grow and market native plants. Chamberlain is also examining the social factors that influence adoption of forest farming practices on private lands.

CONSERVATION BUFFER RESEARCH

Mike Dosskey, NAC research ecologist, was the featured speaker, July 30, 2012, at two Capitol Hill seminars. His presentation featured a new GIS-based targeting tool that shows where conservation buffers should be located in agricultural landscapes to maximize retention of sediments, nutrients and other water pollutants. For more information, including Dr. Dosskey’s presentation: http://www.ncfar.org/Hill_Seminar_Series_2012.asp

2012 SCIENCE DELIVERY AWARD

Gary Bentrup was recognized with the Research & Development Deputy Chief’s Science Delivery Award for his creative efforts and contributions in the area of Science Delivery and Technology Transfer through sustained research productivity

NAC WEBINAR WITH NC STATE EXTENSION

Gary Bentrup, Research Landscape Planner, collaborated with North Carolina State University Extension and gave a webinar, A Practical Field Guide for Designing Conservation Buffers. There were 32 participating in group settings, 55 individuals participating. Attendees were from 28 states, the District of Columbia, Puerto Rico, Brazil and Spain.

FY 2012 Requested Publications

Working Trees Series

Agriculture / Spanish	5,166
Communities	4,598
Energy	6,269
Livestock / Spanish	4,854
Livestock - SE / Spanish	32
Living Snow Fence	8,067
Silvopasture	3,795
Wildlife	7,548
Treating Waste	0
Water Quality	6,182
TOTAL	46,511 (434 Foreign)

Windbreak Series (set of eleven)	17,720
Windbreaks for Conservation	1,261
Miscellaneous	3,132
Conservation Buffer Guide	602
Conservation Buffer Guide/Spanish	130
CanVis	197
TOTAL	23,042 (188 Foreign)

Working Trees Info Series

Alley Cropping	4,235
Forest Farming	5,357
Riparian Forest Buffers	1,118
Windbreaks	1,058
TOTAL	11,768 (6 Foreign)

Countries Served

Argentina	Japan
Australia	Mexico
Brazil	The Netherlands
Canada	Nigeria
Colombia	Pakistan
Costa Rica	Spain
Ethiopia	Tanzania
India	United Kingdom
Indonesia	

Product Distributed Worldwide - 81,321*

*Does not include technical notes, newsletters, displays, slide shows or videos.

relatively new to many producers and professionals in the region. In order to address this information gap, agency partners in Pennsylvania have been proactive in raising awareness about agroforestry and promoting its many benefits. For example:

- Agroforestry Workshops held in 2011 and 2012 targeting producers, landowners, and natural resource professionals, with a focus on silvopastures, forest farming, buffers, and windbreaks.

- Establishment of an agroforestry demonstration site at Dickinson College Farm through a PA-DCNR Bureau of Forestry grant from the USDA Forest Service.

- NRCS in Pennsylvania updated its technical guidance to include agroforestry practices. The Guidance now includes standard criteria for all five agroforestry practices, financial program payment scenarios for windbreaks and riparian forest buffers, a Tech Note for establishing windbreaks around poultry production facilities, and Conservation Stewardship Program guidance on planting edible trees and shrubs as part of agroforestry practices.

- NRCS in Pennsylvania also added Forestry and Agroforestry categories to its Conservation Innovation Grants program,

including demonstrations of alley cropping, multi-story cropping, short rotation woody biomass added to annual crop rotations, direct tree seeding methods, and establishing pollinator habitat on forest edges.

- The PA-DCNR Parks program obtained a grant to conduct a pilot “goats in the woods” project to remove invasive vegetation at King’s Gap Environmental Education Center in Cumberland County.

FUTURE ACTIONS

Promoting agroforestry will take place on several fronts, including increased cooperation with state agencies and outreach to individuals. Potential actions include:

- Work with NRCS State Technical Committees in the Bay states to promote agroforestry practices through Farm Bill programs.

- Train-the-trainer agroforestry workshops targeting resource professionals in the watershed is a first step toward reaching watershed landowners. Subsequent workshops will introduce agroforestry practices to landowners.

- Establish agroforestry demonstration areas by finding early adopters with working farms and forests willing to host visitors so that others can see

the conservation and economic benefits first-hand. Pursue USDA Conservation Innovation Grants and other funding sources to establish these sites.

- Design and implement on-farm agroforestry research projects where other farmers and stakeholders can talk with scientists and learn about cutting-edge and regionally relevant science.

- Work with the NRCS Ecological Sciences staffs in the Bay states to get all five agroforestry practices included in the Field Office Technical Guide and Farm Bill programs.

- Explore a Bay Branding campaign for agroforestry products similar to *Edible Chesapeake* but focused specifically on foods and products developed from businesses committed to sustainable working forests within the Bay area.

The Agroforestry Strategy is Section 4 of the Chesapeake Forest Restoration Strategy (<http://executiveorder.chesapeakebay.net/chesapeakeforestrestorationstrategy.pdf>). To learn more, contact Sally Claggett, sclaggett@fs.fed.us or Tom Ward, Thomas.Ward@gnd.usda.gov 🌱

CHESAPEAKE BAY AGROFORESTRY IN ACTION

The Catawba Sustainability Center (CSC) is a 377-acre tract of farm and forestland nestled in the Catawba Valley in the Upper James River Basin. The CSC is an Outreach and International Affairs initiative of Virginia Tech. At the CSC located in a key Chesapeake Bay headwaters, community members, students, and other stakeholders collaboratively learn about agroforestry in a setting focused on both economic growth and environmental stewardship.

In 2008 Catawba Landcare, a local landowner group working at the CSC, expressed interest in agroforestry and a partnership with the USDA National Agroforestry Center. To date, the partners have established fruit, nut, and floral riparian buffer demonstrations, native medicinal forest farming trials, windbreaks, and edible roadside landscapes. They have also offered accompanying workshops and training events, which have contributed to over 3 miles of private riparian forest buffer plantings, a small demonstration windbreak, a forest farming demonstration plot, and installation of protective fencing. Future plans call for development of a silvopasture demonstration site. 🌱

USDA National Agroforestry Center
1945 N 38th St.
East Campus—UNL
Lincoln, NE 68583-0822

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Upcoming Events

May 21 - 23

Southern Great Plains Windbreak Renovation Conference.
Dodge City, KS
<http://nac.unl.edu/events/southernplainsworkshop.htm>

May 22

Enhancing Habitats To Provide Multiple Ecosystem Services.
Goldsboro, NC
<http://www.cefs.ncsu.edu/newsevents/events/2013/Enhancing-Habitats-2013-Blank-Reg.pdf>

June 9 - 14

First International Symposium on Elderberry
Stoney Creek Inn. Columbia, Missouri, USA
<http://muconf.missouri.edu/elderberrysymposium/>

June 19 - 21

13th North American Agroforestry Conference.
Charlottetown, Prince Edward Island, Canada
www.2013naac.com

June 26 - 29

2013 Cornell Maple Camp.
Paul Smith's College, NY and Lake Placid, NY
<http://www.northernnewyorkmaple.com>

For more upcoming events, visit our website calendar:
<http://nac.unl.edu/events/index.htm>



"Inside Agroforestry" is published by the USDA National Agroforestry Center.

- Phone: 402-437-5178; Fax: 402-437-5712.
- Andy Mason, NAC Director (202-205-1694)
 - Michele Schoeneberger, FS Research Lead (ext. 4021)
 - Richard Straight, FS Lead Agroforester (ext 4024)
 - NRCS Lead Agroforester — vacant

<http://nac.unl.edu>

Mission

The USDA National Agroforestry Center (NAC) is a partnership of the Forest Service (Research & Development and State & Private Forestry) and the Natural Resources Conservation Service. NAC's staff is located at the University of Nebraska, Lincoln, NE. NAC's purpose is to accelerate the development and application of agroforestry technologies to attain more economically, environmentally, and socially sustainable land use systems by working 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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