



...(Lincoln, NE) Agroforestry Mitigates Extreme Weather Effects...(Home)

Kate MacFarland
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Residents of the US and other countries are increasingly facing extreme weather events such as droughts, intense storms, and wildfire. Agroforestry provides many opportunities to help mitigate and adapt to these events through establishing practices that lessen their impact on crops and livestock. This newsletter examines a range of agroforestry practices that can be employed, including riparian forest buffers, silvopasture, windbreaks, alley cropping, and forest farming.

Some of these articles focus on direct interventions that landowners can take to lessen the impacts of extreme weather events on their land. A number of agroforestry practices can be used to reduce fuel loads and make landscapes more resilient to fire. Riparian forest buffers can be used to lessen the impacts of severe storms and flooding.

Windbreaks can be used to distribute snow, increasing water availability in the face of drought. Silvopasture can help reduce stress on livestock at times of extreme heat.

Other articles in this newsletter focus on the role of agroforestry in reducing greenhouse gas emissions. Producing feedstock for biofuels that replace fossil fuels can reduce greenhouse emissions. New tools are being developed to measure how much carbon is sequestered through implementing agroforestry practices on farms and ranches.

Agroforestry practices have multiple benefits, achieving landowners' goals for income creation, food production, habitat improvement, or water quality, while simultaneously providing opportunities to mitigate and adapt to extreme weather events. This newsletter seeks to share information about many of these opportunities. 🌱

Newsletter Outlook

SNOW



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HEAT



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FLOOD

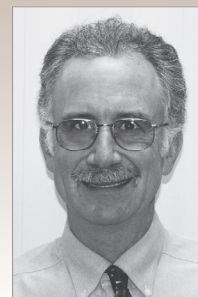


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NAC Director's Corner

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

Extreme weather – means “game on” for agroforestry professionals!



Farmers, ranchers, woodland owners, Tribes, and communities are no strangers to the sometimes devastating impacts caused by drought, flood, wind, heat, cold, and wildland fires. Regardless of what your crystal ball says about the number and extent of future extreme weather events, the impacts could be very significant — especially given the need to provide more food, fiber, and bioenergy that will be demanded by a growing global population -- and the reality of trying to accomplish this from essentially the same agricultural land base we have today.

I urge natural resource professionals to “up their game” regarding agroforestry as a tool to mitigate the impacts of extreme weather events. In this issue of Inside Agroforestry you will learn about how landowners, including Tribes, are putting trees to work in the face of extreme weather and wildfire. At the same time, they may offer “teachable moments” to make the case for integrating agroforestry into a producer’s operation.

I am retiring from the USDA Forest Service in January 2014, so this is my last NAC commentary. The past four years as NAC’s Director have truly been the highlight of my 35 years with the Forest Service!

Looking back, I am very proud of the NAC team and how we have worked with so many partners in the U.S. and Canada to provide the agroforestry information and tools requested by natural resource professionals.

I believe there is an increased awareness of agroforestry and its benefits across the U.S., as well as in Canada and globally. Eight USDA agencies are now working together on the Agroforestry Executive Steering Committee to guide implementation of the USDA Agroforestry Strategic Framework. I encourage you to read the recently released Agroforestry: USDA Reports to America, Fiscal Years 2011-2012. The report and much more is available on USDA’s new agroforestry web pages: www.usda.gov/agroforestry

I will continue working to advance agroforestry in my next chapter. One area I intend to focus on is national certification of agroforesters. I look forward to perhaps working with you on this and other ways to advance the science, practice, and application of agroforestry. Best wishes in 2014!

Sincerely,

Andy Mason

NEW FACES @ NAC

The USDA National Agroforestry Center has two new staff members. Kate MacFarland will help lead the Technology Transfer team at NAC with her experience in organic farming, community planning and biomass utilization.

Joseph Banegas will lend his creativity and experience in publication and graphic design, as well as social media and web content.



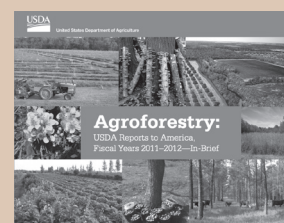
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Secretary's Report

On October 28, 2013, Agriculture Secretary Tom Vilsack released the first-ever report on USDA’s role advancing agroforestry. Agroforestry: USDA Reports to America details how agroforestry practices are helping farmers, ranchers and woodland owners enhance agricultural productivity, protect the environment and increase profits. The report is available at <http://www.usda.gov/documents/usda-reports-to-america-agroforestry-brief.pdf>



USING SHELTERBELTS TO COLLECT WATER FROM SNOW

John Kort, Retired
Agriculture and Agri-Food Canada
Agroforestry Development Centre
Indian Head, SK

EXTREME weather events and changing weather patterns are increasing drought risk in some parts of the world. One way to adapt to this risk is by increasing water availability from snowfall. On the Canadian Prairies and the northern US Great Plains, snow is an important component of annual precipitation, sometimes contributing over 40% of the total. Although snow that is still on the ground in the spring infiltrates into the soil or runs off, during the winter much of the snow is transported by wind and lost. The loss from snow being blown and transported has been estimated to result in losses of up to 30 to 75% of annual snowfall in prairie and steppe environments. Agroforestry practices like windbreaks, which create obstacles on the landscape, can reduce the amount and distance of snow movement and moisture loss. To reduce snow movement, agroforestry practices should take into account their effects on snow hydrology.

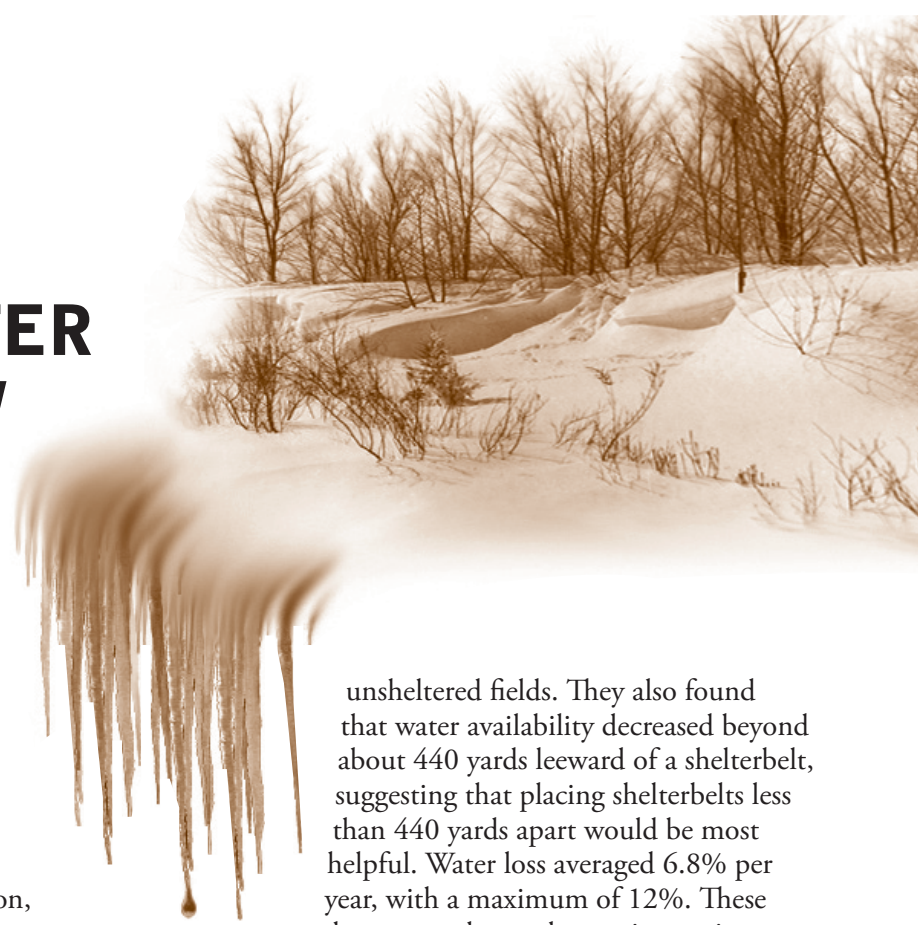
Snow trapping is a major reason that shelterbelts are planted around farmyards, along farm roads, and along major highways. Trapped snow is also an

“...researchers found that landscapes with shelterbelts had 29% more snow water equivalent...”

important contributor to improved crop yields near shelterbelts and provides recharge of surface and groundwater.

In a study in Manitoba and Saskatchewan over 15 winters

between 1996 and 2011, researchers found that landscapes with shelterbelts had 29% more snow water equivalent than unsheltered landscapes. The annual water loss from fields protected by 220 yard wide shelterbelts was calculated to be up to half an inch less than similar



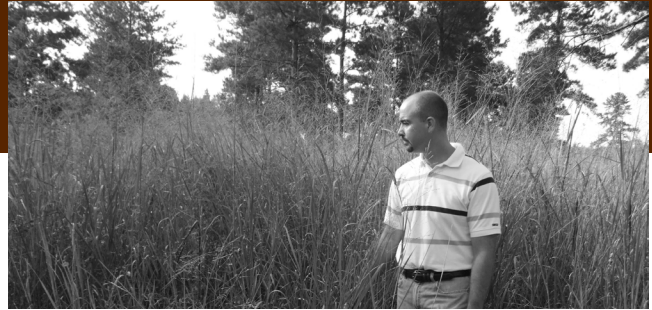
unsheltered fields. They also found that water availability decreased beyond about 440 yards leeward of a shelterbelt, suggesting that placing shelterbelts less than 440 yards apart would be most helpful. Water loss averaged 6.8% per year, with a maximum of 12%. These losses were lower than estimates in some previous studies because of weather and site conditions.

The results of this study show that landscape-level planning can be used to manage snow distribution. Agroforestry can be used to keep snow where it is needed and prevent snow accumulations where it is not wanted. Dense shelterbelts less than about 440 yards apart are efficient snow traps and are useful for recharging groundwater, surface water reservoirs, or wetlands. Using shelterbelts to collect and

distribute snow is most effective when shelterbelts are closer together; shelterbelts that were closer than 220 yards apart were more effective than more widely spaced shelterbelts. Agricultural producers need to decide on a spacing between shelterbelts that will balance the benefits of snow conservation with the practicality of field sizes large enough to accommodate their farm equipment. The increased water availability from snow, especially during years of drought, represents a way to help drought-proof the prairie region in the face of the possible effects of a changing climate. 🌲

Adapted from: Kort, J., Bank, G., Pomeroy, J., & Fang, X. 2011. Effects of shelterbelts on snow distribution and sublimation. Agroforestry Systems, 86(3), 335–344. doi:10.1007/s10457-011-9466-4

PERFECT PAIR FOR BIOFUEL: Switchgrass & Trees



Michael Blazier in a test plot of switchgrass at the Hill Farm Research Station near Homer, LA. (Photo by Mary Ann Van Osdell)

Michael Blazier
Hill Farm Research Station, LSU
Homer, LA

FARMERS are increasingly growing switchgrass, along with other new crops, to produce biofuels. Many of these crops can be grown in agroforestry systems, and their yield may be increased through this arrangement. Any fuel derived from plant biomass is considered a biofuel. Ethanol produced from corn and biodiesel produced from soybeans are the top biofuels produced in the United States. The U.S. biofuel market arose from economic and national security concerns, as well as a concern about climate change that is increasing extreme weather events. By supplying the transportation sector with feedstocks that are less carbon-intensive than fossil fuels, growing switchgrass can help to mitigate climate change.

The energy needs of the United States are too high to be met solely by corn ethanol and soybean biodiesel. For example, using the entire 2008 U.S. corn and soybean crops to produce biofuels would meet only 18 percent of the U.S. transportation fuel demand. However, other materials can be an important piece of the puzzle.

Cellulosic ethanol can be made from nonedible parts of plants, unlike conventional corn- or sugar-based ethanol. Forest biomass and grasses such as switchgrass are promising feedstocks for cellulosic ethanol.

In particular, switchgrass has many characteristics that make it a desirable cellulosic ethanol feedstock. Switchgrass can be grown with minimal fertilization, and it produces high yields even on marginal soils. It is highly tolerant of flooding and drought and has the potential to produce 1,000 gallons of ethanol per acre, which compares favorably with corn and sugarcane. However, growing a crop dedicated predominately to the relatively new biofuel market carries economic risk.

Agroforestry management systems can be developed to integrate switchgrass and forest production. In such systems, switchgrass would be grown as a biofuel feedstock within alleys between trees. Once switchgrass reaches a near-mature state by its second year, it can be harvested annually. The trees can be harvested occasionally as traditional forest products when they reach merchantable size, and the tree branches can be collected and marketed as biofuel feedstocks.

The diversity in products and vegetation offered by such systems would reduce economic risks associated with entering a new

market, maximize yields by optimizing the use of growing space, and improve environmental services such as wildlife habitat, capturing carbon from the atmosphere and storing it in the soil and protecting water quality from nutrient pollution. Several projects are under way by LSU to develop the blueprint for this management system of growing switchgrass in rows between loblolly pine trees. The purpose of these studies is to develop an agroforestry system for producing switchgrass for biofuel in an upland soil typical of north central Louisiana. Switchgrass was planted between rows of newly planted 2-year-old loblolly pine as well as between the rows of 13-year-old and 24-year-old loblolly pine soon after a thinning – or partial harvest – of the plantations. In all pine plantation ages, switchgrass was established between trees by first applying the herbicide glyphosate followed by disking the soil and then broadcast-seeding Alamo switchgrass.

Significantly more switchgrass cover was found by the end of the first growing season beneath the older trees than between newly planted loblolly pine. Furthermore, the quantity of switchgrass cover increased with the number of trees, up to a point. These results illustrate a beneficial influence of shading on switchgrass establishment. Competing vegetation is an impediment to successful switchgrass establishment because of relatively high variability in the dormancy period of switchgrass seed once in the soil, which allows competing vegetation to become established before the switchgrass germinates. At the Hill Farm site, crabgrass was much more abundant where pine shading was absent than in plots with pine shading, suggesting that the shading provided some beneficial competition control for the switchgrass.

Studies at the Hill Farm Research Station have shown that average switchgrass production without fertilization was 2.5 tons per acre per year, with a maximum of 3.5 tons per acre per year. Planting loblolly pine at 300 trees per acre, with row widths of 20 feet to facilitate switchgrass production, has yielded an average of 14 tons per acre of pulpwood by an age-13 thinning operation. Research on agroforestry systems for Louisiana is expanding. In March 2009, a new study was established near the LSU AgCenter Macon Ridge Research Station in Winnsboro, La., to explore growing switchgrass in alleys between eastern cottonwood trees. The purpose of this study is to develop an agroforest system for producing switchgrass and cottonwood as biofuel feedstocks on a

soil characteristic of the marginal-quality soils found within the lower Mississippi River alluvial valley. While the region has abundant soils well-suited to agricultural production, some soils require too much irrigation and fertilization to produce conventional crops profitably. Switchgrass and eastern cottonwood, however, can thrive on such soils with relatively little

fertilization and no irrigation. Cottonwood can grow as much as 8 feet in height per year on such soils and can yield as much as 700 gallons of ethanol per acre. Cottonwood and switchgrass were successfully established, and energy yields, water quality and soil properties associated with this agroforestry system will be monitored in coming years. 🌱

Adapted from Blazier, Michael. 2009. Perfect Pair for Biofuel: Switchgrass and Trees. Louisiana Agriculture Magazine: 52(4). <http://www.lsuagcenter.com/enl/communications/publications/agmag/Archive/2009/fall/Perfect+Pair+for+Biofuel+Switchgrass+and+Trees.htm>

CUBAN COWS

Have it Made in the Shade

Boyd Kidwell

Contributing Editor, Progressive Farmer
Cary, NC

Shade plays an important role in Brian Tomazi's cow-calf operation near Cuba, Mo. Over the past few years Tomazi has thinned the hardwood trees at the edges of his grazing paddocks and moved his fences back 150 to 200 yards to take advantage of additional grazing areas.

The Missouri cattleman says his 70 cows and their calves respond well to a pattern of cooling off under the shade trees, grazing across open pasture, visiting a water source and grazing their way back to shade. After weaning, Tomazi backgrounds groups of calves in his intensive grazing setup.

"The animals use shade to regulate their body temperature. After they cool off in the shade, they go back out and graze until they're full and hot again," says Tomazi.

To provide extra shade, Tomazi thinned his hardwoods to a distance of 20 to 30 feet between trees. In an effort to allow better air circulation, he trimmed lower limbs to 20 feet off the ground. After applying lime and fertilizer, he planted fescue and clover for a new grass stand. Paddocks now have up to four acres of additional grazing area.

The combination of thinning competing trees and fertilization has increased the growth of remaining hardwood trees and the oaks produce bumper crops of acorns to attract whitetails. Tomazi and his family are avid deer hunters.

Tomazi's calving season runs from Aug. 15 to Oct. 15 and he keeps expecting cows in paddocks with plenty of shade.

"Before we had access to this much shade, I lost a few calves from cows that gave birth in direct sun in hot weather.

Given a choice, my cows have their calves in a cool, shady area during the early part of the calving season," says Tomazi.

Research backs up the Missouri cattleman's observation that shade improves beef production. In a recent study by University of Missouri researchers, weight gains for calves given shade were slightly better (2.06 pounds/day vs. 1.79 pounds/day) than for calves without shade.

The big improvement from shade was demonstrated in the pregnancy rate of cows at the end of the study. The pregnancy rate for cows offered shade was 88% compared to only 50% for cows with no shade.

"We suspect the lower pregnancy rates in groups with no shade are the result of heat stress causing cows to slip calves," says Missouri Extension specialist Dusty Walter, a Midwest authority on timber and cattle. 🌱



A view in one paddock showing open grass, shaded grass and the adjacent ungrazed woodlands. (Photo by Brian Tomazi)

PROTECT YOUR LAND

Using Agroforestry Techniques and Tribal Values to Mitigate Wildfire Danger

Colleen Rossier

National Agroforestry Center

Frank Lake

US Forest Service

Orleans, CA

Impacting airline flights, threatening homes, and causing weeks of smoky air, wildfires are a dramatic part of summer in much of the western United States. In fact, they are becoming larger and more intense as climate change decreases winter snow pack and causes more severe droughts in forests that are ready to burn. Thus, it is increasingly important for landowners to manage their lands with fire in mind.

Landowners demand much more than fire-safety out of their properties, however. They want to grow food, timber, herbs, and flowers. They want to host barbecues and birthday parties. They want to create habitat for wildlife and enjoy nature close to home. And they want places of beauty and comfort.

Agroforestry practices can help landowners turn their properties – whether they are small suburban woodlots or large farms – into landscapes that accomplish their goals and improve their quality of life, while also protecting themselves from catastrophic wildfire.

DENSE VEGETATION – A POTENTIAL FIRE HAZARD

Frank Lake is a Forest Service scientist who has been called to work on many fires in northern California, where he lives. In the past few years, he also transformed his own property from an unmanaged woodlot, densely crowded with scraggly Douglas-fir, madrone, chinquapin, oak, bay laurel, and tanoak trees – and a fire waiting to happen – into a fire-ready forest farm, using native edible plants to supplement his vegetable garden and small fruit and nut tree orchard. Beyond his property gate, many of the forests near Lake's home are at high risk of fire because fires have not been

removing young trees and understory brush (the “fuels”) as frequently as historically done by Native Americans. Meanwhile, naturally ignited lightning fires have also been suppressed, and thus, a large amount of fuel has built up in these forests. When fire does ignite in the dry summer months, it burns more intensely than would be the case if there had been more frequent understory burns. This makes it all the more important for Lake and his neighbors to “fire-safe” their own properties.

TRIBAL PERSPECTIVE

Lake, of Native American ancestry, has learned how the Karuk and other tribes of the area traditionally understood the forest landscape, and used fire and other practices to manage it for food, medicine, firewood, building and basketry materials, and to reduce the risks of catastrophic wildfires.

To convert his 5-acre property from a dense woodlot into a useful, beautiful, and fire-safe forest farm, Lake is putting traditional ecological knowledge from the local tribal Elders back into practice. He is also incorporating concepts and skills he learned through his professional experiences working in the Forest Service and from people practicing and teaching permaculture and agroforestry in northern California and southern Oregon. These experiences help him decide which trees to cut down, which species and forms to nurture, when and how to use prescribed burns, and how to harvest and process the resulting products.

STEP 1: EVALUATING THE EXISTING LANDSCAPE

To start Lake first evaluated each tree and shrub around the house and garden for its ecological and cultural functions – from fire safety to food and basketry materials. He did this in zones, starting close to the house and working outward to create mosaics of “defensible space” that would be separated by footpaths and dirt trails that



Forest Service scientist Frank Lake's yard contains raised beds of evergreen huckleberries, native hazelnuts, and serviceberries (foreground), Douglas-firs and his garden of fruit trees, vegetables, and chickens (mid-ground), and forest edge of tanoaks and more Douglas-firs (background). (All Photos by Frank Lake)

serve as fuel breaks while allowing Lake to manage all parts of his property year round.

Through his assessment, he decided to keep most of the mature older tanoak trees, large Douglas-fir trees and other hardwoods, but to remove the brushy understory since it could serve as hazardous fuel were a fire to ignite. Similarly, the Karuk and Yurok Tribes would have favored trees that provided acorns, firewood, basketry and building materials around villages, camps, and along trails. Tribes would have burned beneath the trees at certain times of year in zones to foster the growth of edible and medicinal plants and mushrooms while reducing pests and pathogens, creating access for hunting and gathering, and protecting these resources from the hotter and more severe fire that could ignite if vegetative fuels were allowed to build up over many years.

To help his property realize its greatest potential, Lake also incorporated his understanding of the microclimates across the landscape into his design. He did this by knowing the different soils on his property and which patches get the greatest amounts of light and experience frost over the course of the year. Understanding his landscape in this way, he is able to grow plants that require minimal maintenance and each play several roles: increasing privacy, providing wild and domestic fruit and nuts for his family and wildlife, producing stems for basketry and adding color to the property through the seasons.

STEP 2: PUTTING HIS PLAN INTO

ACTION: THINNING AND BURNING

Lake worked with the Orleans-Somes Bar Fire Safe Council and neighbors to do the thinning and burning needed to make his property safer. The prescribed burning also favors the native plants that Lake's family uses and have been used by Karuk and Yurok for generations. Again, they worked in zones, first clearing the immediate area around his house. Next, they cleared understory trees and brush along the property boundary and emergency access routes. They thinned more heavily on the southern side of his property to increase light to his garden and young fruit and nut trees.

As they thinned, they separated the resulting wood into piles of firewood and building materials (e.g., shed poles), and burned the limbs and foliage in piles. In some of the openings created by felled trees, they seeded old burn piles with native forbs and grasses while in others they



Before thinning



After thinning

planted wild berries or cultivated varieties of native fruit and nut shrubs, such as serviceberry, elderberry, and hawthorn. In this way, Lake designed his fire-safing treatments to enhance his garden as well.

STEP 3: NATIVE PLANTS FOR MINIMAL MAINTENANCE

The edible native plants Lake grows include evergreen huckleberries, gooseberries, service berries, elderberries, hazel, and several varieties of raspberry in adjacent gaps and under a canopy of tanoaks that provide acorns and Douglas-firs and madrones that provide firewood to heat his home in the winter. Lake now burns small, low-intensity prescribed fires beneath his acorn trees to get rid of the infertile and bug-ridden acorns that the trees drop first. This ensures that he gets a higher quality harvest, while also hastening the return of nutrients to the soil, and creating a fuel break. After the burns, he gathers tanoak acorns and shares them with Yurok and Karuk family and friends who make acorn soup, a “medicine food” that is an essential part of ceremonial meals. While traditionally burned in the fall, Lake is doing research to determine what times of year are best to burn under acorn trees given the changed forest conditions of the past century.

Lake has also built raised beds for his cultivated and wild berries. In the beds farther from the house, he transitions his garden into the forest edge, enhancing the “ecotone” with native trees, shrubs, vines and ferns that he grows for food, basketry, regalia, dyes, and more. Terraced areas among the rock beds are planted with medicinal and food plants. Many of these are wild geophytes, such

as brodiaeas and lilies, which have edible bulbs and beautiful flowers that attract pollinators.

STEP 4: SHARING THE KNOWLEDGE

Lake incorporates many other traditional practices in the maintenance of his forest farm, and he also wishes to share this knowledge with the tribal youth in his community.

Thus, in 2007, Lake partnered with a newly founded collaborative effort between the Karuk Tribe and University of California-Berkeley, to revitalize traditional Karuk forest management techniques through research projects and youth education. In 2012, the Karuk/UC-Berkeley Collaborative was awarded an Agriculture and Food Research Initiative grant from the USDA's National Institute of Food and Agriculture. As one component of that grant, Lake and others are doing research projects to measure the effects of traditional practices, such as prescribed burning on the quality and quantity of traditional foods, such as acorns, hazelnuts, and huckleberries.

The Karuk youth are participating in some of the monitoring efforts as well as the prescribed burning done on private lands by the Fire Safe Council and the subsequent harvesting of culturally useful plants. It is absolutely critical to engage the youth today so that they can continue the generations-old Karuk traditional agroforestry management practices to reduce fire risk, while also enhancing the food, fiber, and fuel resources of the forest. Many others outside of the tribe also have much to learn from these important techniques. 🌱

Riparian Forests Protect Streambanks During Flooding



**Charles J. Barden and
Wayne A. Geyer**
Kansas State University
Manhattan, KS

Riparian forests provide many recognized ecological benefits, including shading the stream to reduce temperature fluctuations, providing organic matter input to the aquatic ecosystem, and absorbing pollutants such as excessive nutrients from runoff or subsurface flow. Woody vegetation is also highly effective for stabilizing streambanks and reducing erosion under normal streamflow conditions. Streambank erosion is a natural adjustment process of rivers, but lateral migration rates of the channel can be accelerated by reducing the resistance of bank material or increasing the velocity of the water. During flood events woody vegetation reduces streambank erosion by slowing streamflow speed (and thus erosive energy), trapping sediments and debris in the stems and trunks, and holding the soil with woody and fine root systems. This is called flood attenuation. Riparian woodlands do not reduce flooding, but they reduce the damage that

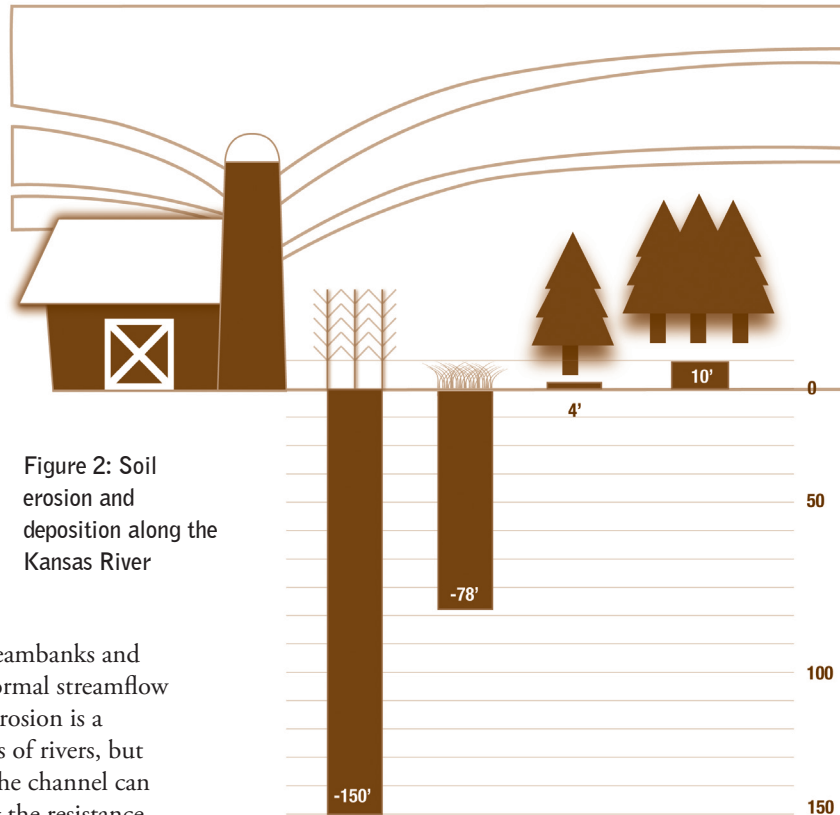


Figure 2: Soil erosion and deposition along the Kansas River

Stream discharge varies greatly with precipitation and other weather events (snowmelt), and numerous climate change scenarios point to more episodes of extreme weather in the future. Will riparian woodlands continue to protect streambanks effectively even under extreme flooding conditions? To answer that question a study was conducted to examine the effect of the Flood of 1993 on the Kansas River. That flood was classified as a 500 year event, due to the extremely high flows, but a similar event was also recorded in 1950 in this same watershed in northeast Kansas. The Kansas River basin covers about 60,000 square

miles in three states, and a 40 mile reach was studied just east of Manhattan, KS. Aerial photos of the river were compared from December 1992 (pre-flood) to December 1993 (post-flood). At data collection points every 500' landcover vegetation types in a 100 foot wide zone were classified from the 1992 photos. The following categories were used, forest, crop, grass, or single tree-row. The categories were based on what the dominant land cover type (>51%) was observed, either woody vegetation, crop field or grass land. Sites classified as single tree-row had at least a single line of trees on the bank, adjacent to one of the agricultural land uses. Erosion and deposition amounts were estimated by measuring the perpendicular distance from the 1992 streambank to the 1993 streambank. Data were collected at 204 streambank points, with 96 points classified as forest, 47 as grass, 37 as crop,

floods can cause. Even fallen tree trunks, depending on their orientation, can help deflect current away from the bank.

Figure 1 is a photograph of Hickory Creek in Butler county Kansas which clearly demonstrates the effect of bank vegetation on erosion. Note in the foreground, where crops are grown right up to the bank, rapid erosion and bank sloughing is evident, resulting in a vertical unstable cut bank. Contrast that with the background area, which is heavily wooded, with a gently sloping, stable bank, with little erosion evident.

Streambank channel erosion varies with channel morphology and position. Erosion rates are typically highest at the outside bends, whereas sediments may be deposited on inside bends, where velocities are slowest. Erodibility depends on bank height, the ratio of root depth to bank height, bank angle, soil surface protection and soil texture.



Figure 1. Hickory Creek, Butler County, south central Kansas. (Photo by Phil Balch)

Continued on page 11

National Agroforestry Center

Update 2013

A Partnership of the Forest Service and Natural Resources Conservation Service

The USDA National Agroforestry Center (NAC) Update highlights annual accomplishments of products, programs and research. For more information about the USDA National Agroforestry Center visit <http://nac.unl.edu> or contact the Center at 402-437-5178, ext 4011.

Technology Transfer

Agroforestry Academy

NAC supported the first-ever Agroforestry Academy, developed and delivered through a Sustainable Agriculture Research Grants (SARE) grant awarded to the University of Missouri in partnership with NAC and the Mid-America Agroforestry Working Group. This seven-state pilot “train the trainer” workshop provided agroforestry training and generated input from natural resource professionals on how future training can be best accomplished. A second Academy pilot will be held in Minnesota in 2014. The success of the academy has encouraged the working groups in the northeast and northwest to consider similar training.

Spanish Translations of *Working Trees Info Sheets*

NAC worked with NRCS in Puerto Rico to develop Spanish translations of NAC’s “What is Agroforestry?” and “Income Opportunities” Information Sheets; adding to NAC’s available Spanish publications.

eXtension Forest Farming Community of Practice

NAC continued its support of the eXtension Forest Farming Community of Practice; the website lets practitioners, extension agents, and others share information and ideas. Through an agreement with Virginia Tech, working with Cornell and the Southern Research Station, NAC supported the production of two video series on non-timber forest products that were put on YouTube.

Southern Plains Windbreak Renovation Workshop

Responding to demand generated by the 2012 US-Canadian Windbreak Renovation and Innovation Conference, NAC assisted Kansas Forest Service and NRCS to conduct the Southern Plains Windbreak Renovation Workshop in Dodge City. The emphasis was on increasing landscape resilience to extreme weather events.

Staff Updates



Kate MacFarland was hired as NAC’s Assistant Agroforester in August 2013. Kate comes to NAC after two years in USFS State and Private Forestry - Cooperative Forestry, working on woody biomass utilization. Previously she has worked on agroforestry and other natural resources issues at a variety of organizations.



Joe Banegas was hired as NAC’s Information Assistant in November 2013. Joe left his position as Assistant Director with Crossmen Productions, Inc. a 501 (c)(3) not-for-profit organization. There he took an active role in marketing and communications, as well as managing the day-to-day logistics.

Research

Creating Climate-Smart Ag Landscapes through Agroforestry

At the at the 68th International Soil and Water Conservation Society Annual Conference in July 2013 in Reno, NV, NAC researcher Gary Bentrup presented research carried out with NAC researcher Michele Schoeneberger and other colleagues related to agroforestry opportunities to create landscapes that reduce greenhouse gases and increase climate resilience.

Indexes for Targeting the Placement of Vegetative Buffers in Agricultural Watersheds

In January 2013, NAC scientist Mike Dosskey and other colleagues published a paper in the Journal of the American Water Resources Association. This paper compares and contrasts different indexes that target specific locations for riparian buffers. To test the indexes, they were applied to watersheds in Missouri and New Jersey.

Dosskey, Michael G., Zeyuan Qiu, and Yang Kang, 2013. A Comparison of DEM-Based Indexes for Targeting the Placement of Vegetative Buffers in Agricultural Watersheds. Journal of the American Water Resources Association (JAWRA) 49(6):1270-1283. doi: 10.1111/jawr.12083

Resources in the Continuous Living Cover Toolbox

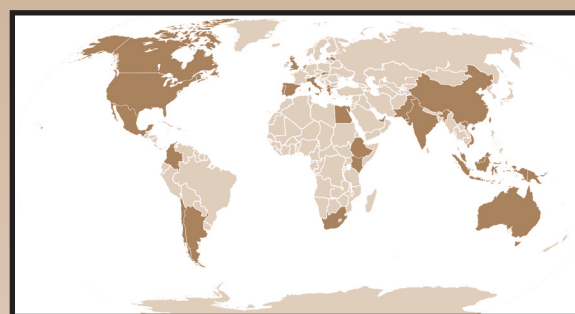
In November 2013, NAC researcher Gary Bentrup presented at the Green Lands Blue Waters conference in Minneapolis, Minnesota. Gary's presentation described how integrating continuous living cover into agricultural landscapes involves designing appropriate practices on both the whole farm and landscape scales. The presentation described a sampling of farm and landscape-level tools available to achieve farmer, landowner, and community goals.

CFAR Presentation by NAC Researcher

NAC researcher Michele Schoeneberger was invited by the National Coalition for Food and Agriculture Research (CFAR) to present an overview of how agroforestry can be used to create resilient and profitable farms and landscapes under erratic and extreme weather events to Congressional staffers and NGOs.



FY2013 Requested Publications



Countries Serviced

67,719 Distributed Worldwide*

Argentina	India	Papua New-Guinea
Australia	Indonesia	Portugal
Canada	Italy	Slovakia
Chile	Kenya	South Africa
China	Latvia	Spain
Colombia	Macedonia	UAE
Cyprus	Malaysia	U.K.
Egypt	Mexico	Vietnam
Ethiopia	Netherlands	
Greece	Pakistan	

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

Working Trees Series

Agriculture / Spanish	5,052
Communities	3,512
Energy	3,317
Livestock / Spanish	4,202
Livestock-SE / Spanish	60
Living Snow Fence	1,977
Silvopasture	3,908
Wildlife	5,957
Water Quality	5,216

Totals **33,201**
(208 International)

Working Trees Info Series

Alley cropping	2,543
Forest Farming	2,748
Heat Stress	994
Income	2,704
Riparian Forest Buffers	4,060
Silvopasture	774
What is Agroforestry	3,039
Windbreaks	2,382

14,711
(255 International)

Other

Windbreak Series (set of eleven)	5,783
Windbreaks for Conservation	1,007
Miscellaneous	7,089
Conservation Buffer Guides	559
CanVis	273

19,244
(100 International)

and 24 as single tree-row. Thus, 59% of the banks had at least some trees.

Land-cover vegetation significantly ($p < 0.01$) affected the lateral movement of the streambank. Both forest and single tree-row vegetation types collected soil, with mean deposition of 10' and 4' respectively, which were not significantly different from each other (Figure 2). Grassland sites lost an average of 78', while crop field sites lost an average of 150'. Surface acreage of the lost agricultural land was estimated

for each mile: Grassland lost 9.4 acres, and cropland lost 18.2 acres. The latter is equivalent to losing about a quarter section of land for every 10 miles of stream length running through crop land. Thus, even during a 500-year flood event on a major river, the presence of trees in the riparian zone made a clear difference in the lateral migration, erosion, and deposition of sediments.

These results show that woody vegetation is highly effective for protecting streambanks even during severe flooding.

Standing trees slow water velocity, thus reducing the energy available for erosion, and allowing disposition of flood-borne sediment. Greater rooting depth along with larger and stronger roots also helps stabilize the soil mantle. To protect agricultural land in the face of extreme weather events such as flooding, natural stands of timber should be left standing on streambanks, and riparian buffers containing trees should be established in areas where trees are absent, to reduce streambank erosion. 🌲

Advancing the Agroforestry

Component in **C**limate **C**hange

Michele Schoeneberger
National Agroforestry Center
Lincoln, NE

Agroforestry is all about Working Trees for ...well, work! And while they are working, whether protecting crops, livestock, farmsteads and/or roads, enhancing water quality, holding soils in place or generating more income from nontimber forest products, timber or hunting revenues, they are also working to address climate change mitigation. They do this by sequestering carbon (C) in woody biomass and soil, as well as reducing other greenhouse gas emissions. And, even though this work occurs no matter what the landowner's primary goals are, it is a contribution well worth accounting for. Mitigating greenhouse gases and adaptation to extreme weather events go hand-in-hand. For instance, a windbreak put in place to mitigate the impacts of a weather extreme on production provides the additional benefit of

sequestering C, which in turn ultimately determines the long term health and productivity of the soil. By accounting for the carbon being sequestered through agroforestry practices, landowners can better understand how big a contribution these practices can play in reducing their greenhouse gas footprint, as well as possibly provide a productive, profitable avenue for participating in future potential C markets. However, measuring these contributions can be challenging. Other tools often do not include agroforestry practices. In addition, they may not measure carbon sequestration at a scale that is meaningful to landowners. The USDA Natural Resources Conservation Service, in collaboration with the Natural Resources Ecology Laboratory (NREL) at Colorado State University, has created a user-friendly, web-based tool called COMET (CarbOn Management Evaluation Tool) to help farmers and ranchers do just that. In fact, the latest version of this tool, COMET-FARM (www.comet-farm.com), was just released this summer. COMET-FARM can help producers calculate how much carbon their land's soil and vegetation can remove from the

atmosphere. The tool also will help producers calculate and understand how land management decisions impact energy use and greenhouse gas emissions. "The unique thing about COMET-Farm is that it allows the people who know the most about what is happening on the land – the farmers – to use very sophisticated technology to quantify greenhouse gas emissions but with an easy-to-use online system," said Keith Paustian, professor in CSU's Department of Soil and Crop Sciences and leader of the COMET-Farm development team. The tool allows users to input information about soil characteristics, crop rotations, tillage, fertilization, and the location of their land. COMET-Farm then estimates carbon sequestration and greenhouse gas emission reductions associated with conservation practices for cropland, pasture, rangeland, livestock operations and energy. COMET-FARM does not currently support agroforestry. The prior version, COMET 2.0 (www.comet2.colostate.edu) does and can be used to compare how carbon sequestration and greenhouse gas emissions can be altered at the farm-level through inclusion of agroforestry

practices. A recent workshop, hosted by USDA NRCS, NREL and the USDA National Agroforestry Center, brought together a team of COMET and agroforestry experts to identify key information gaps and potential sources of data and expert knowledge necessary to refine the agroforestry module. Support for agroforestry and other woody systems, like orchards and vineyards, is scheduled to be added in late 2013. 🌲

Adapted from: "Researchers create online tool to estimate greenhouse gas reductions through conservation agriculture." July 12, 2013. <http://phys.org/news/2013-06-online-tool-greenhouse-gas-reductions.html>

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Upcoming Events

February 5–7, 2014

PASA's 23rd Annual Farming for the Future Conference
State College, PA.
<http://conference.pasafarming.org>

February 18-20, 2014

Longleaf Academy: Longleaf 101
Cheraw State Park, South Carolina
<http://www.longleafalliance.org/events/sc-11-101-february-2014>

February 27-March 1, 2014

Minority Landowner 8th Anniversary Conference
Greenville, SC
<http://www.minoritylandowner.com>

April 1-4, 2014

Drought in the Life, Cultures, and Landscapes of the Great Plains
Lincoln, NE
<http://www.unl.edu/plains/2014-symposium-drought>

April 12, 2014

Shitake Mushroom Culture Workshop
Greenbank, WA
Pre-registration required
<http://snohomish.wsu.edu/forestry/mushroom.htm>

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



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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.

Policy

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