



NATIONAL AGROFORESTRY CENTER | ANNUAL REPORT

FY2016

Background

Across America, farmers, ranchers, and forest owners are working with natural resource professionals to integrate forestry and agriculture – and U.S. Department of Agriculture’s National Agroforestry Center (NAC) is leading the way. Located in the USDA Forest Service, Research and Development Deputy Area, our mission is “**To advance the health, diversity, and productivity of working lands, waters, and communities through agroforestry**”.

Many owners and managers of America’s working lands are striving to maintain or increase production while conserving wildlife, soils, water, and other ecosystem services. For the natural resource professionals who advise farmers on meeting their production and conservation goals, agroforestry is an important tool among the suite of options at their disposal, and, with NAC’s help, this approach is expanding year after year.

In FY2016, our Research Team advanced agroforestry research and released new or updated tools such as the Non-Timber Forest Product Calculator and AgBufferBuilder. Our Technology Transfer and Applications Team developed and delivered new science-based agroforestry information through in-person training and the production of technical materials, as well as through new, innovative means such as our Agroforestry Connection e-mail service and new on-line webinar library.

Research Highlights

Advancing windbreaks for crop yields and greenhouse gases

More than 75 million acres of US lands are susceptible to wind erosion, resulting in 4 to 5 million acres of moderately to severely damaged soils annually. By planting and maintaining windbreaks, landowners can reduce wind erosion, help reduce greenhouse gases, and impact crop yields. NAC’s advancement of windbreak science in FY2016 included:

1. “Estimating Carbon Storage in Windbreak Trees on U.S. Agricultural Lands.” by Ballesteros, Possu, Brandle, Domke, Schoeneberger, and Blankenship in *Agroforestry Systems* (2016), an article that provides a new methodology for approximating windbreak carbon.
2. Increasing knowledge of windbreak impacts on crop yields. As part of its efforts to provide farmers with the most current data on the impacts of agroforestry, NAC is supporting the Regional Windbreak Study lead by Kansas State University (KSU). In association with many partners, KSU is collecting and analyzing data on crop yields from fields in proximity to windbreaks and from fields without windbreaks to determine how windbreak effects today compare with those under previous agricultural systems. If results from this study mirror those conducted 30 years ago, natural resource professionals will have recent, relevant data that will encourage farmers to maintain existing windbreaks and/or establish new ones.

Innovations to expand investments in riparian forested buffers to improve water quality and increase ecosystem services

Riparian forest buffers continue to be a conservation priority across USDA. Much of the work and research by NAC in FY2016 focused on developing tools to increase adoption of this important practice.

1. Improving water quality with AgBufferBuilder. In partnership with the University of Kentucky, NAC released AgBufferBuilder, a GIS tool which substantially advances the ability of natural resource professionals to design cost-effective buffers to increase water quality. The AgBufferBuilder tool can be downloaded at the NAC website: <https://nac.unl.edu/tools/AgBufferBuilder.htm>. Plans for FY 2017 include upgrading the tool for use with the latest versions of ArcGIS.

2. Supporting riparian management for mixed land-use areas. In partnership with New Jersey Institute of Technology, NAC published a new process for deciding among management alternatives for riparian areas in mixed land-use, multi-jurisdictional landscapes. This will help communities to overcome decision paralysis in cases where there are multiple resource issues and stakeholder perspectives. The publication can be downloaded from <http://www.sciencedirect.com/science/article/pii/S016920461630010X>.

3. Adding edible economic benefits to riparian forested buffers. In partnership with Virginia Tech, Appalachian Sustainable Development, and the US Fish and Wildlife Service, NAC developed the “Non-Timber Forest Product Calculator.” This is a tool for natural resource professionals to determine the economic benefits of including edible and floral forest products in riparian forest buffers. Such products to buffers can help landowners to gain income. This work supported by a Virginia Natural Resources Conservation Service (NRCS) Conservation Innovation Grant. The calculator is available at: <https://nac.unl.edu/tools/ntfp.htm>.

4. Enhancing agroforestry’s role in ecosystem services markets. In partnership with Virginia Tech, NAC is working to develop recommendations and practical tools for merging Virginia’s nutrient credit trading markets and agroforestry production in Virginia’s region of the Chesapeake Bay Watershed. This project received support from a 2015 NRCS National Conservation Innovation Grant as well as from the National Fish and Wildlife Federation. Designs created at NAC were used to examine model agroforestry systems; NAC staff also provided coordination, as well as advice on demonstration site planting designs.

Enhancing forest conservation and use through forest farming

Forest farming is the cultivation of high-value specialty crops under the protection of a forest canopy. This important practice can enhance the sustainability of non-timber forest products and provide an additional income source to forest landowners.

1. [Growing opportunities beneath the canopy through the Appalachian Beginning Forest Farmers Coalition.](#)

Thanks to the work of Virginia Tech and a number of partners, forestland owners across Appalachia are learning how to increase the economic benefits of the forests they conserve and technical assistance providers are learning how to better help them in this work. This project included establishing the Appalachian Beginning Forest Farmer Coalition, educating, training, and supporting beginning forest farmers and technical assistance providers, and other services. NAC's role has included helping to develop training and workshops for technical service providers. This is the first National Institute of Food and Agriculture (NIFA) Beginning Farmer and Rancher Development Program project to target forest landowners.

2. [Shiitake Mushrooms: A Commercial Forest Farming Enterprise.](#) This blog post publicized the work carried out by the Cornell Small Farms Program, an important NAC partner, to increase log-grown mushroom cultivation. This blog post increased traffic to the NAC website from USDA, Facebook, and Twitter and generated a number of inquiries about forest farming.

Agroforestry Inventory of Great Plains States

Through a partnership with Forest Inventory and Analysis (FIA) at Northern Research Station and the University of Nebraska, NAC is creating an inventory of Trees Outside Forests (TOF) using high-resolution aerial imagery. Due to the linear nature and small patches of trees in the Great Plains, creating a geospatial tree canopy cover has unique challenges, of which there currently exists no adequate resources to measure how much is on the landscape.

1. Trees Outside Forests Image-based Inventory (TOFii) uses GIS to analyze high resolution 1-meter publically available aerial photography to create a land cover map with emphasis on agroforestry systems such as riparian buffers and windbreaks. Work is currently underway in Nebraska and Kansas and for two time periods; 2004 & 2014. This dataset will create an inaugural layer of statewide data for accounting and management purposes.
2. A linear intersect sampling GIS tool, created by the USFS Geospatial Technology and Applications Center (GTAC), is being used to estimate the amount of windbreaks in the Great Plains states. Anecdotal evidence suggests that windbreaks are being removed on the landscape, yet no large scale inventory exists to study. This GIS tool, in conjunction with high-resolution aerial photos, allows users to quickly quantify the amount of windbreaks over a large area. Two time periods are being done initially which can be used for change analysis.

Outreach and Technology Transfer and Applications Highlights

Education and training for agriculture and natural resource professionals

Through our multimedia approach, NAC has continued expanding its outreach capabilities to ensure that natural resources professionals have an array of agroforestry learning resources at their disposal. For FY2016, these include:

1. [Webinar Library](#)

Through NAC’s webinar library, agriculture and natural resource professionals can now access more than 75 webinars hosted by organizations including NRCS, NIFA, Cornell University, University of Missouri, and the Ohio Watershed Network. These webinars cover a range of agroforestry topics including windbreak renovation, forest farming, conservation buffers and many more.

2. [Sample Workshop Agendas](#)

Our Technology Transfer staff actively works to meet the growing demand for assistance in developing and hosting agroforestry “training-of-trainers”. To help meet this need, in addition to providing in-person support, we developed agendas for 1.5, 3, and 5 day trainings that follow the “agroforestry academy” model (developed through a North Central PDP SARE grant).

3. [Image Library](#)

Many professionals seek high-quality images of agroforestry practices to enhance their outreach capabilities. NAC responded to this need by launching an image library on Flickr with sample pictures for the five most common temperate agroforestry practices.

Direct outreach

NAC provided on-site technical training to more than 200 natural resource professionals this year who work with a diversity of landowners and producers including small, new, and beginning farmers and ranchers. Presentations were provided at more than twenty meetings and conferences as well as at a number of train-the-trainer workshops.

Among the many highlights for this year was our presentation on the Future of Pollinators: Why Agroforestry Matters, at the University of Missouri Annual Agroforestry Symposium. Participants included more than 300 on-site attendees and 1700 participants online. Another highlight was the Northeast Advanced Agroforestry Training for Natural Resource and Agricultural Educators. The National Agroforestry Center partnered with the State of Pennsylvania Bureau of Forestry, Penn State, and other members of the Northeast/Mid-Atlantic Agroforestry Working Group, to provide agroforestry training for technical assistance providers and agriculture educators. The project is funded by a Northeast SARE PDP grant.

Windbreak Technology and Design Course

NAC staff partnered with NRCS to help lead this training-of-trainers in Bismarck, North Dakota. The thirty-one participants from across the country, including NRCS, state forestry and conservation district employees, are now poised to extend the latest windbreak technologies to others, through their own local training courses. In addition, hundreds more professionals will be able to learn through on-line video recordings, to be made available in 2017.

Publications

As usual, the demand was high for NAC's print and on-line publications and, as in previous years, NAC clients are making more use of our web site to download publications and learn about agroforestry. More than 75,000 hard copies of NAC publications were mailed out in response to requests from 49 states, and 17 countries, representing state and federal agencies, consultants and industry groups, universities, non-profits, and individuals. In addition, there were more than 25,000 web sessions and 20,000 web users in FY16, and many downloads of a wide array of publications and tools.

This year, NAC addressed the need for technical information through the production of seven new publications addressing a range of topics including pollinators, climate change, green infrastructure, multifunctional riparian buffers, and water quality. These publications have been used by partners as communication tools and technical resources. Regularly distributed publications include the Inside Agroforestry Newsletter, Agroforestry Notes, and Information Sheets, which can be accessed at: <https://nac.unl.edu/publications/>. In addition, NAC also produces floor displays that can be viewed at <https://nac.unl.edu/multimedia/displays.htm>.

Expanding Agroforestry Partnerships

On April 27 and 28, NAC hosted the Agroforestry Horizons meeting. Fifty leaders in agriculture and natural resources, from government, universities, non-profits, and the private sector, shared experiences and insights on agroforestry. Presentations and discussions focused on roles of agroforestry in supporting water quality, soil health, economic diversification, food security, and wildlife habitat. Organizations represented included American Soybean Association, Field to Market, Dow Chemical, National Wildlife Federation, the Conservation Fund, National Farmers Union, Minority Landowner Magazine, Nobel Foundation, universities from the East, the Mid-West, and the West, USDA, EPA, state government and conservation districts.

Strengthening connections with the agriculture community

Agroforestry is inherently multidisciplinary. While NAC enjoys long relationships with many partners in the forestry and agricultural sectors, in FY2016 NAC was intentional about reaching out to new partners in the agriculture community. This included presenting on agroforestry opportunities at the National Association of County Agricultural Agents conference and the Sustainable Agriculture Education Association meeting, as well as participation at the Soil Health Institute's first annual meeting. To connect with the agricultural research community, NAC also participated in the 2016 International Annual Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America.

Paving the way for the future

In addition to the progress described above, NAC has also paved the way for new projects in the coming year:

Great Plains Windbreak Action Plan

Staff at NAC have been working with partners across the Great Plains to develop an action plan for advancing windbreak establishment and management across the Great Plains. The action plan framework will be produced in FY2017.

Plant Selection Guide

A guide has been developed for selecting species of trees and shrubs that can produce better conservation results. Over 90 species of trees and shrubs are rated for 14 different purposes in the Great Plains. The tool will be posted on the NAC website through which a system will be put in place to crowd-source reviews and suggestions for improvements from regional experts. The tool will then be revised and refined as needed.

Agroforestry leases with new and beginning farmers

Working with the Savanna Institute and Farm Commons, NAC is supporting farmers interested in leasing land for agroforestry from landowners. The project involves developing resources, case studies, economic models, and more.

Train-the-Trainer Opportunities

NAC will continue its leadership in presenting at a number of train-the-trainer workshops in 2017, including those hosted by the University of Missouri, University of Minnesota, and the Northeast/Mid-Atlantic Agroforestry Working Group.