



U.S. DEPARTMENT OF AGRICULTURE

# Agroforestry

Across USDA Agencies



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# Overview of USDA Missions and Programs that Support Agroforestry

Agroforestry is the intentional integration of trees and shrubs into crop and animal production systems to create environmental, economic, and social benefits for farmers, forest managers, ranchers, and communities. Through agroforestry, farmers, ranchers, and forest landowners are integrating productivity and profitability with environmental stewardship to support healthy, sustainable agricultural

systems and communities. Many agroforestry approaches can support ecosystem services such as water, wildlife, and carbon sequestration, as well as provide additional income for landowners and those leasing agricultural or forest lands. While often associated with rural areas, agroforestry is also being adopted in urban and community lands, to enhance ecosystem services and food production.

## The five common agroforestry practices in the United States are:



**Silvopasture** practices with trees, livestock, and forages reduce heat stress in livestock, increase wildlife diversity, protect the soil from water and wind erosion, and add organic matter to improve soil quality.



**Forest farming** with edible, herbal (botanicals), medicinal, and decorative crops grown under managed forest cover can provide shorter-term income while high-quality trees are being grown for wood or other tree products.



**Windbreaks**, also known as shelterbelts, for fields, farmsteads, and livestock, provide shelter from the wind and protect against soil erosion.



**Alley cropping** with high-value trees and shrubs planted in rows to create alleys or narrow paths where annual crops are produced, improve economic and plant diversity, wildlife habitat, and air and soil quality.



**Riparian forest buffers** along waterways filter sediment, nutrients, pesticides, and animal waste from runoff.



USDA is supporting agroforestry across its agencies through their mission programs, short-term projects, and research activities. Specifically, the eight member agencies of the Interagency Agroforestry Team and the USDA Agroforestry Executive Steering Committee each contribute to advancing agroforestry through their unique expertise and approaches.

These eight agencies are:

- ▲ **USDA Agricultural Marketing Service**
- ▲ **USDA Agricultural Research Service**
- ▲ **USDA Farm Service Agency**
- ▲ **USDA Forest Service**
- ▲ **USDA National Agricultural Statistics Service**
- ▲ **USDA National Institute of Food and Agriculture**
- ▲ **USDA Natural Resources Conservation Service**
- ▲ **USDA Rural Development**





# USDA Agricultural Marketing Service

## Mission

The Agricultural Marketing Service (AMS) administers programs that create domestic and international marketing opportunities for U.S. producers of food, fiber, and specialty crops. AMS also provides the agriculture industry with valuable services to ensure the quality and availability of wholesome food for consumers across the country.

Nearly 4,000 AMS professionals work every day to support the country's diverse agricultural operations, which range from individual farmers to international businesses that employ 1 in 12 people. AMS's services and its millions of dollars in annual **grant investments** also create opportunities by supporting economic development in small towns and rural communities that stand as the backbone of American values.

## Relevant Agency Programs

AMS programs that most directly tie to agroforestry are those that have the potential to support marketing opportunities for agroforestry products. These include those focused on specialty crops, local food market channel research, grant programs, market news, the local and regional food working group, and organic or food safety certification programs.

Much of the agency's support for agriculture is provided through commodity-specific efforts, such as its Dairy; Specialty Crops; Livestock, Poultry and Seed; and Cotton and Tobacco Programs. For fruit and vegetable growers, the Specialty Crop Program offers voluntary food safety audits, including the Good Agricultural Practices (GAP) and Good Handling Practices (GHP), Harmonized GAP, and Group GAP.

AMS also oversees the National Organic Program, Science and Technology Program, and the Transportation and Marketing Program. The AMS Transportation and Marketing Program houses grant programs, including the Farmers Market Promotion Program, the Local Food Promotion Program, and the Specialty Crop Block Grant Program (SCBGP), as well as a Marketing Services Division that conducts research and hosts voluntary online directories on local food market channels.

The Specialty Crop Block Grant Program enhances the competitiveness of specialty crops, which includes fruits,

vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture).

The Acer Access and Development Program (Acer) offers grants to support the efforts of States, tribal governments, and research institutions to promote the domestic maple syrup industry.

The Federal State Marketing Improvement Program (FSMIP) offers grants with a one-to-one dollar match to assist in exploring new market opportunities for U.S. food and agricultural products, and to encourage research and innovation aimed at improving the efficiency and performance of the marketing system.

The Specialty Crop Multistate Program (SCMP) enhances the competitiveness of specialty crops by funding collaborative, multi-state projects that address the following regional or national level specialty crop issues: food safety; plant pests and disease; research; crop-specific projects addressing common issues; and marketing and promotion.

AMS also provides regulatory oversight for over 20 **research and promotion programs** and enforces other Federal regulations such as the **Perishable Agricultural Commodities Act** and the **Seed Act**. AMS also hosts the interagency Local and Regional Food Working Group, which coordinates programs across the U.S. Department of Agriculture (USDA) that support local and regional food systems and maintains web pages and a **Local Food Compass Map**. The searchable map shares local food system assets and infrastructure, as well as projects across the country funded through USDA and other Federal programs.

## Select Agroforestry Projects and Activities

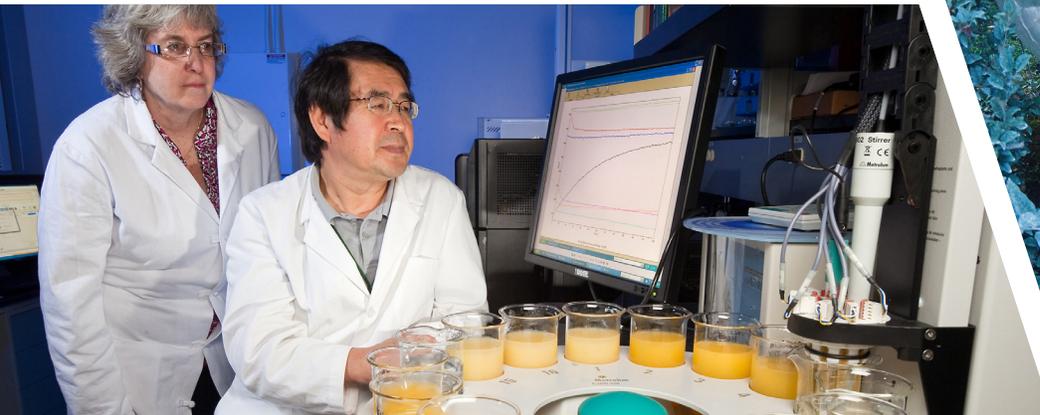
Through the programs described above, AMS supports many different projects and activities across the United States. In particular, the grant programs offer an opportunity to focus on commodity-specific projects to support agroforestry businesses. An increasing number of AMS programs focus on opportunities to expand food business enterprises through local and regional sales channels. For example, in Hawaii, the **Hawai'i 'Ulu Cooperative** is revitalizing an under-utilized, indigenous crop, breadfruit, as a dietary staple in the state.

Through the Local Food Promotion Program, the Cooperative is working with small-scale farms to move efforts from a mostly pilot effort to promote and reintroduce the crop to a thriving commercial product. The project aims to further promote the product with targeted institutions and outlets, support farmer capacity and infrastructure development, and increase market diversification through new market channels. In Washington, the University of Washington will study best practices for developing a maple syrup industry in the Pacific Northwest as part of an Acer Access grant. In Missouri, a Specialty Crop Block Grant was used to evaluate the ability of upland sites with irrigation and cultivated varieties of Black Walnut to transition from marginal farmland to commercially viable agroforestry.

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# USDA Agricultural Research Service

## Mission

The Agricultural Research Service (ARS) is the principal in-house research agency of the USDA. It is one of the four component agencies of USDA's Research, Education, and Economics mission area. Congress first authorized federally supported agricultural research in the Organic Act of 1862, which established what is now known as the USDA. That statute directed the Commissioner of Agriculture "... To acquire and preserve in his Department all information he can obtain by means of books and correspondence, and by practical and scientific experiments..." The scope of USDA's agricultural research programs has been expanded and extended many times since it was first created. ARS conducts research to develop and transfer solutions to agricultural problems of high national priority and provides information access and dissemination to:

- ▲ Ensure high-quality, safe food and other agricultural products
- ▲ Assess the nutritional needs of Americans
- ▲ Sustain a competitive agricultural economy
- ▲ Enhance the natural resource base and the environment
- ▲ Provide economic opportunities for rural citizens, communities, and society

## Relevant Agency Programs

The agency's four national program areas serve to bring coordination, communication, and empowerment to the approximately 690 research projects carried out by ARS. The national programs focus on the relevance, impact, and quality of ARS research. The program areas are:

- ▲ **Animal Production and Protection**
- ▲ **Crop Production and Protection**
- ▲ **Natural Resources and Sustainable Agricultural Systems**
- ▲ **Nutrition, Food Safety/Quality**

While agroforestry is integrative across these program areas, most ARS research on agroforestry systems is in the Natural Resources and Sustainable Agricultural Systems Program Area. This program supports researchers at 70 locations who are developing the technologies and strategies needed to help farmers, ranchers, and other managers effectively steward the diverse agricultural mosaic spread across the Nation. From livestock grazing on expansive natural Western rangelands, to crops grown in the rich Midwestern Heartland and the Southern States regions, to the high value produce that comes from the valleys and plains along both coasts, these diverse landscapes generate more than \$200 billion in goods and services that are the basis of a strong rural economy. Emphasis is given to developing technologies that are and will be economical to use and systems that support profitable production and enhance the Nation's vast renewable natural resource base. ARS identifies research priorities through

a continual dialogue with a wide range of customers and stakeholders to ensure that the agency's science is relevant and provides effective solutions to their concerns. ARS addresses issues affecting both private and public lands because together these are the foundation of a healthy and vibrant agricultural industry that not only provides food, feed, fiber, and renewable energy to the Nation, but also abundant and high-quality supplies of fresh water and clean air, as well as healthy ecosystems.

Program areas within the Natural Resources and Sustainable Agricultural Systems are:

- ▲ **Grass, Forage, and Rangeland Agroecosystems**
- ▲ **Soil and Air**
- ▲ **Sustainable Agricultural Systems**
- ▲ **Water Availability and Watershed Management**

## Select Agroforestry Projects and Activities

Agroforestry research is being conducted in most of these national programs. Research projects focus on designing and evaluating the production and environmental effects from forested riparian buffers, shelterbelts, and field windbreaks; determination of water requirements from tree components in agricultural landscapes; production and environmental effects from use of gray waters for tree plantations, including use of brackish and saline waters; how to utilize forest byproducts for developing new economic activities; strategies to control and/or gain benefit from brushy species in rangelands; and characterizing greenhouse gas emission reductions and soil

carbon sequestration in silvopasture practices. ARS also manages the National Arboretum, which contains species of trees and shrubs that serve as a living library for genetic potential in agroforestry systems.

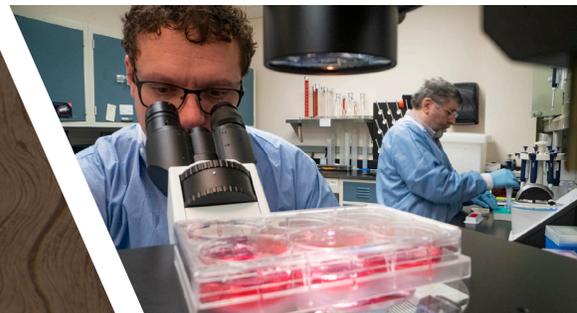
ARS also manages agroforestry research through collaborative pass-through funding for Mississippi State University, Oregon State University, the University of Maine, and the University of Missouri's Center for Agroforestry. These projects address the role of the forest products sector in the U.S. economy and the need to create new and improved value-added products, renewable energy, wood-quality evaluations, and valuation improvements for the benefit of the nation's wood supply. Projects are conducted in consultation with the USDA Forest Service, Forest Product Laboratory.

Given the broad scope and scale of research projects funded through the ARS programs, the following examples represent just an overview of the types of projects currently being funded. A more complete listing of ARS projects is presented in the appendix. There are numerous studies quantifying the effects of agroforestry on ecosystem services, including riparian buffer effects on water quality and soil erosion, windbreak effects on air quality surrounding confined animal production systems like poultry houses, and agroforestry systems providing pollinator habitat. There are silvopasture projects in which the effects of the trees on livestock and forage productivity are assessed, including a project in which degraded forest is being rehabilitated through grass production. There are two projects studying how windbreaks and forested riparian buffers capture herbicide drift and influence its fate in the environment. There is also a project studying how windbreaks and silvopasture trees influence the microclimate and affect agricultural productivity.

## For More Information

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# USDA Farm Service Agency

## Mission

The Farm Service Agency (FSA) is equitably serving all farmers, ranchers, and agricultural partners through the delivery of effective, efficient agricultural programs for all Americans. FSA administers farm commodity, crop insurance, credit, environmental, conservation and emergency assistance programs for the Nation's farmers and ranchers.

## Relevant Agency Programs

FSA has several programs and other assistance available to farmers, ranchers, forest landowners and other agricultural producers. These programs are designed to retain a stable agricultural system, providing food and fiber to America and the world while conserving natural resources. Agroforestry practices can be established with technical and financial assistance provided by FSA.

Among these programs is the **Conservation Reserve Program (CRP)** authorized in the 1985 Farm Bill. For over 35 years, CRP participants have voluntarily removed cropland and certain marginal pastureland from production and converted it to conservation covers of either grass or trees that provide soil, water, and wildlife habitat benefits. CRP is one of the largest conservation programs in USDA history. The enrollment of CRP acres is close to the current cap of 24 million acres, providing soil, water, and wildlife benefits. Producers enrolled in CRP plant long-term, resource-conserving covers, such as approved introduced or native grasses or hardwood trees to improve the quality of water, control soil erosion, and enhance wildlife habitat. Contract terms range from 10 to 15 years. Grass covers constitute over 90% of the land enrolled in CRP. However, among CRP tree cover practices is riparian forest buffers, an agroforestry practice. Interested, eligible agricultural producers are encouraged to enroll in CRP and install riparian forest buffers on suitable land to catch field runoff and protect water quality. CRP provisions prohibit agricultural production on lands enrolled in CRP, but forest lands in CRP can be managed in such a manner that upon contract expiration, the land can easily be incorporated into a silvopastoral operation.

The **Conservation Reserve Enhancement Program (CREP)** is an offshoot of the CRP. CREP targets high-priority conservation issues identified by local, state, or tribal governments or non-governmental organizations.

The Biomass Crop Assistance Program, authorized with the passage of the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill) and administered through FSA, also offers opportunities to integrate agriculture and energy production.

## Select Agroforestry Projects and Activities

Agroforestry practices administered through FSA with landowners include alley cropping, forest farming, riparian forest buffers, silvopasture, and windbreaks. Many of these practices are consistent with participation in the agency's commodity programs. FSA is dependent on the Forest Service and National Resources Conservation Service (NRCS)

for outreach and technical assistance to landowners and agricultural producers participating in FSA programs and the technology transfer initiatives of the National Agroforestry Center (NAC) in Lincoln, Nebraska.

As of 2021, approximately 1.6 million acres have been enrolled in agroforestry practices under CRP and CREP since 1985. Currently there are approximately 642,000 acres enrolled in agroforestry practices. According to a recent report from the USDA Economic Research Service (EIB-215), *The Fate of Land in Expiring Conservation Reserve Program Contracts, 2013-16*, land originally enrolled in CRP under a tree-cover practice were the most likely to be reenrolled, and tree cover was far more likely to remain on lands exiting CRP. For enrolled acres, the most common practices applied are riparian forest buffers, field windbreaks, and shelterbelts.

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# USDA Forest Service

## Mission

The Forest Service mission is “to sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.” Within the Forest Service, three mission areas support agroforestry programs and activities:

- 🌲 **Research and Development**—Developing and communicating the scientific information and technology needed to manage, protect, use, and sustain the natural resources of forests and rangelands.
- 🌲 **State and Private Forestry**—Connecting people to resources, ideas, and one another in order to care for forests and sustain their communities.
- 🌲 **National Forest System**—Protecting and managing the 155 national forests and 20 national grasslands so they best demonstrate the sustainable multiple-use management concept, using an ecological approach to meet the diverse needs of people.

## Relevant Agency Programs

### RESEARCH AND DEVELOPMENT

The Forest Service represents the world’s largest natural resources science capacity. Nationwide, Forest Service scientists carry out basic and applied research that result in science-based applications and tools that support management of all the Nation’s forests and trees, including the agroforestry Research and Development (R&D) activities conducted by the **National Agroforestry Center (NAC)** (described later in this document). The **Forest Inventory and Analysis Program (FIA)** surveys, analyzes, and reports on the status and trends in forest area and location. Assessment work accomplished under this program does not include most agroforestry plantings because they do not meet the standard definition of a “forest.” However, FIA staff located at the **Northern Research Station**, in cooperation with the NAC and State forestry agencies, have been advancing the use of Geographic Information System tools for assessing agroforestry practices across the Great Plains.

### STATE AND PRIVATE FORESTRY

Through Forest Service grants and cooperative agreements, State forestry agencies and other partners deliver assistance directly to customers through three State and Private Forestry (S&PF) “umbrella” program areas that receive annual Federal appropriations: **Cooperative Forestry**, **Forest Health Protection**, and **Cooperative Fire Protection**. The two Cooperative Forestry programs most important to supporting agroforestry activities



are the **Forest Stewardship Program** (FSP) and the **Urban and Community Forestry** (U&CF) Program. Through FSP, landowners receive technical and financial assistance to complete a long-term, multi-resource **Forest Stewardship Plan**, which may include agroforestry practices. Through the U&CF Program, communities receive technical and financial assistance to establish and protect community trees and forests to improve air quality, water quality, human health, and wildlife habitat. This landscape-scale approach often requires planning and integrating agroforestry systems into the green infrastructure of larger landscapes that include a matrix of urban, rural, agricultural, and forest lands. Forest Health Protection programs provide national leadership in protecting America's forest and tree resources through technical and financial assistance to Federal, State, Tribal, and private landowners to assess, prevent, suppress, and control forest insects, pathogens, and invasive plants.

### NATIONAL FOREST SYSTEM

Although the application of agroforestry practices/systems on the 193 million acres of national forests and grasslands managed under National Forest System programs is limited, low intensity silvopastoral practices/systems, sometimes called forest grazing, are applied on some national forests. While there are many “non-timber,” or “special” forest products gathered on national forests (e.g., florals, foods, and medicinal products), these tend to be “wild harvested” rather than intentionally produced, and therefore do not fall under the definition of forest farming. However, the practice of forest farming on private lands may be helpful in reducing pressures on public lands to provide such products.

Opportunities may occur in the future to expand the application of agroforestry on national forests and grasslands as part of larger landscape-scale efforts with adjacent cooperating landowners/land managers to accomplish conservation and sustainable production goals. The Forest Service supports the science, practice, and application of agroforestry primarily through its R&D and S&PF programs, with a current focus on non-Federal working lands. In addition, through its **International Programs**, the Forest Service, in cooperation with a wide range of partners, also provides some assistance to support agroforestry in other countries, primarily in the tropics.

## Select Agroforestry Projects and Activities

While the National Agroforestry Center, described in a separate section below, is a key hub of Forest Service involvement in agroforestry, efforts by other units across the Forest Service, in collaboration with partners, also support the advancement of agroforestry knowledge and adoption. The Forest Service Southern Research Station has, for example, engaged in and supported research and outreach in forest farming, in collaboration with Virginia Polytechnical Institute and State University, and other partners. The Pacific Southwest Research Station has conducted research on agroforestry-related traditional ecological knowledge, on a range of ownerships including national forests, with an emphasis on land management for wildfire and culturally important foods production. At the Northern Research Station, Forest Inventory and Analysis staff have worked for many years in cooperation with the National Agroforestry Center to support GIS assessments of Trees Outside of Forests in the Northern Great Plains. In addition, several USDA climate hubs have supported research and outreach related to agroforestry with assistance from Forest Service scientists. The Northeast Climate Hub, for example has partnered with the National Agroforestry Center to discover and disseminate agroforestry information, tools and resources as they relate to climate change.

In regard to agroforestry on private lands, State forestry agencies have included agroforestry in the State Forest Action Plans developed in order to participate in Forest Service-funded programs. Urban and Community Forestry grants have also supported urban agroforestry. An example is the Community Food Forestry Initiative by Earth Learning, to provide planners, decision-makers, and others with resources to integrate food-producing trees and plants into the urban landscape. Another project, by the Giving Grove Inc., aims to create a network of holistic urban orcharding processes in major metropolitan areas, utilizing green infrastructure to improve health and wellness in High Potential Communities.

## For More Information

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# USDA National Agroforestry Center

## Mission

The **USDA National Agroforestry Center** is a partnership between the Forest Service Research and Development (R&D); the Forest Service State and Private Forestry (S&PF); and the Natural Resources Conservation Service (NRCS). Authorized in the 1990 Farm Bill and established in 1992 in Lincoln, Nebraska, the Center is administratively assigned to the Forest Service's R&D Deputy Area in Washington, D.C.

The mission is "To advance the health, diversity, and productivity of working lands, waters, and communities through agroforestry." The Center conducts research, develops technologies and tools, delivers training, and provides science-based information on agroforestry nationwide. While its primary audience is agriculture and natural resource professionals who work with farmers, ranchers, forest landowners, and communities, many of its materials can be used directly by each of these target audiences.

Coordination and partnerships with an extensive network of organizations are critical to the Center's success. These organizations include USDA agencies, universities/extension, Tribes, State forestry and agriculture agencies, conservation districts, nongovernmental organizations, and other private land entities.

## Relevant Agency Programs

Center efforts are focused on addressing three problem areas:

- ▲ Agroforestry Ecosystem Services—To advance the understanding and quantification of agroforestry impacts on key ecosystem services
- ▲ Social and Economic Dimensions of Agroforestry—To better understand factors influencing adoption and retention of agroforestry
- ▲ Agroforestry Education, Networks, and Support—To accelerate and support information transfer to landowners and land managers

### RESEARCH AND DEVELOPMENT

The Research Team conducts, synthesizes, and distills research. It also produces tools and information that support land management decision-making. All published research is available to the public and posted on the Center's website.

### EDUCATION AND OUTREACH

In cooperation with partners, the Center delivers agroforestry information and tools nationally across agroforestry practices. Products include publications such as Inside Agroforestry newsletter, Technical Notes, and Working Trees brochures, as well as training sessions/materials and displays. These are all available on the Center's **website**, in addition to an agroforestry webinar library, photo library and other items. This information is incorporated into technical guidelines and training courses by NRCS and other partner organizations.



## Select Agroforestry Projects and Activities

A detailed listing of recent and ongoing Center projects is provided in the Appendix, and a few are described here. The Center has undertaken an extensive review of agroforestry adoption surveys conducted in the United States. Results are being synthesized into five manuscripts, each covering an agroforestry practice. These peer-reviewed publications will allow managers to better understand the drivers effecting agroforestry adoption as well as the benefits and challenges producers face, and other factors. The first two publications on **windbreak** and **silvopasture** adoption have been released. Publications on riparian forest buffers, forest farming and alley cropping will follow. These syntheses have supported the design of the first National Agroforestry Producer Survey conducted through a partnership with the National Agricultural Statistics Service. The Center has also led and/or participated in a number of studies related to ecosystem services. These include a synthesis on

pollinators and agroforestry as well as studies on the carbon contributions of silvopasture and trees outside of forests. In addition, the Center continues to advance tools that assist landowners to calculate the financial implications of various agroforestry practices.

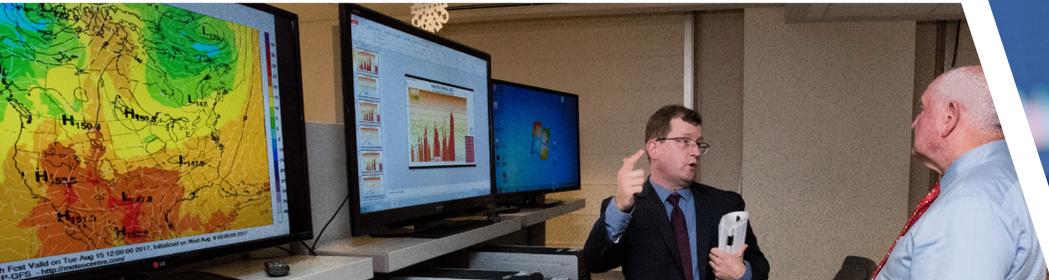
Recent outreach projects have addressed the need for information at the regional level. Efforts to that end have included strengthening regional agroforestry networks, such as support for the first meeting of the newly established Southwest Agroforestry Action Network, and support for agroforestry training workshops by the Pacific Northwest Agroforestry Working Group. In addition, the Center has been offering an annual grant opportunity to develop regionally specific agroforestry information and education materials. Thus far, cooperative agreements are being implemented in 18 states across the country, including Hawaii, and the District of Columbia, in support of alley cropping, forest farming, silvopasture, riparian forest buffers, windbreaks, and urban agroforestry.

### For More Information

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# USDA National Agricultural Statistics Service

## Mission

The National Agricultural Statistics Service (NASS) provides timely, accurate, and useful statistics in service to U.S. agriculture. The agency conducts hundreds of surveys every year and prepares reports covering virtually every aspect of U.S. agriculture. Production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of U.S. producers are only a few examples.

## Relevant Agency Programs

The Census of Agriculture is a complete count of U.S. farms and ranches and the people who operate them. Even small plots of land—whether rural or urban—count if \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. Conducted once every five years, the Census of Agriculture looks at land use and ownership, operator characteristics, production practices, income, and expenditures. The Census of Agriculture provides the only source of uniform, comprehensive, and impartial agriculture data for every county in the nation.

Through the Census of Agriculture, producers can show the nation the value and importance of agriculture and can influence decisions that will shape the future of U.S. agriculture.

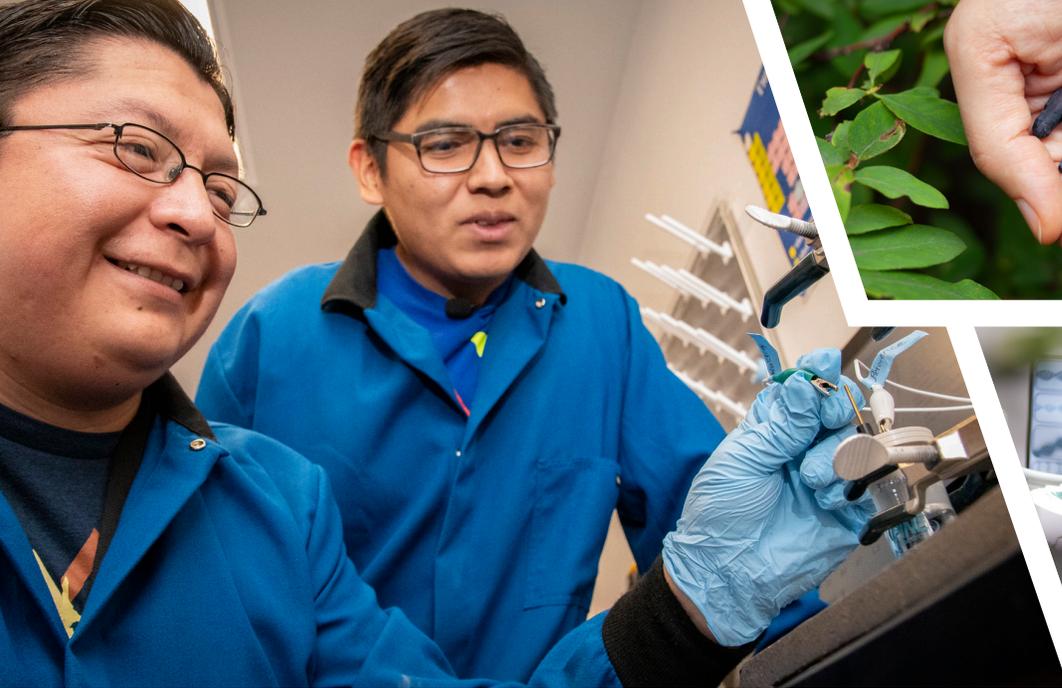
## Select Agroforestry Projects and Activities

The 2017 Census of Agriculture included a broad agroforestry question. Results from this question show that agroforestry use is widespread across the United States with 30,853 farms utilizing at least one agroforestry practice on their operation. States with at least 1,000 producers estimated to be practicing agroforestry include Pennsylvania, Virginia, Oregon, Missouri, New York, North Carolina, Ohio, Wisconsin, Washington, California, Kentucky, and Minnesota. To obtain a greater understanding of this census value, the USDA National Agroforestry Center initiated a collaboration with USDA NASS, NRCS and ARS to conduct a follow up survey to the 2017 Census of Agriculture. This survey will be sent to approximately 11,000 farmers and ranchers which represent a significant proportion of the producers answering “Yes” to the 2017 agroforestry census question. Data from this follow up survey will be used to assess how producers established their agroforestry systems, management practices, species used, benefits/challenges, products from their systems, where products are sold, and acreage by practice type.

## For More Information

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# USDA National Institute of Food and Agriculture

## Mission

Located in USDA's Research, Education, and Economics mission area, the mission of the National Institute of Food and Agriculture (NIFA) is to lead food and agricultural sciences to create a better future for the Nation and the world.

## Relevant Agency Programs

NIFA was established in the 2008 Farm Bill to support exemplary research, education, and extension programs that address many challenges facing the Nation. NIFA works with the best and brightest scientists at universities and colleges throughout the United States and around the world to find innovative solutions to global problems. With a timely, integrated approach and collaboration with other Federal science agencies, NIFA also serves as a vital contributor in science policy decision making. Research supports the discovery of new approaches needed to solve many of the issues facing the Nation and the world. Education strengthens schools and universities to train the next generation of scientists, educators, producers, and citizens. Extension brings the knowledge gained through research and education to those who need it most—people in the United States and around the world. NIFA has two key mechanisms for accomplishing its mission.

### NATIONAL PROGRAM LEADERSHIP

NIFA helps states identify and meet research, extension, and education priorities in areas of public concern that affect farm, forest, and ranch producers; small business owners; youth and families; and communities.

### FEDERAL ASSISTANCE

NIFA provides annual capacity grants to the Land-Grant University System and competitive grants to researchers in land-grant and other universities. NIFA also partners with other Federal agencies, within and beyond USDA, nonprofit organizations, professional societies, commodity groups, grower associations, multistate research committees, private industry, citizen groups, foundations, regional centers, the military, task forces, and other groups and organizations.

### RESEARCH

NIFA solicits applications for competitive programs, several of which may include agroforestry. Awards are made to land-grant and other universities, Federal research agencies, and nongovernmental organizations. Competitive programs include:

- ▲ Sustainable Agriculture Research and Extension (SARE), which offers competitive grants to fund research and education projects that advance sustainable agricultural practices in the United States. Eligible recipients of funding: farmers and ranchers, researchers, extension agents and other educators, graduate students. The funds are administered by five regional centers.

- ▲ Agriculture and Food Research Initiative (AFRI) through the Bioenergy, Natural Resources, and Environment (BNRE) Foundational and Applied Science Priority Area, which provides competitive research, extension, and combined research and extension grants to develop new knowledge in science areas that have need/potential for actual application.

Applications are reviewed by panels of experts from outside NIFA, and recommendations are made for funding. In addition to competitive grants, NIFA awards Hatch Act formula grants to land-grant universities for research in the agricultural and environmental sciences. The McIntire-Stennis formula funds are awarded to more than 70 universities and are used specifically to support forestry research.

### EDUCATION

NIFA makes competitive awards to universities, faculty members, and graduate students through several programs directed at 1862, 1890, and 1994 land-grant universities; Hispanic-Serving Institutions; Alaska Native-Serving Institutions, Native Hawaiian-Serving Institutions, and Tribal colleges. These awards support faculty development, fellowships, capacity building, resident instruction, distance learning, and curriculum development at eligible institutions of higher education. Agroforestry projects can be funded through higher education programs.

### EXTENSION

Through an extensive network of State, regional, and county extension offices in every state and territory, NIFA supports the application and extension of new and existing research-based information to a wide variety of audiences. These offices have educators and other staff who respond to public inquiries and conduct informal, noncredit

workshops and other educational events. Information and programs are delivered through print media, videos, CDs, workshops and seminars, internet sites, and webinars. With support from more than 600,000 volunteers, 4-H (USDA's 105-year-old youth development program administered through NIFA) engages more than 6.5 million young people every year and teaches them life skills through hands-on learning and leadership activities. Smith-Lever and Renewable Resources Extension Act funds are used to plan, conduct, and evaluate extension programs, including agroforestry, delivered by the Cooperative Extension System.

## Select Agroforestry Projects and Activities

Agroforestry research and education projects have been supported through the competitive programs described above. A detailed description of each program, accompanied by examples of agroforestry-related research and education funded through each, is provided in the **Guide to USDA Agroforestry Research Funding Opportunities** produced by the USDA National Agroforestry Center in coordination with NIFA. Examples of research and education supported with SARE grants for example, include a project on crop performance, pests, and pollinators in diverse agroforestry systems in the Midwest; silvopasture research and demonstrations in Virginia; and research on economically significant agroforestry outputs for a tropical island environment in Hawaii. More SARE-funded agroforestry projects can be found in the **Index of SARE Agroforestry Grants** produced by the National Agroforestry Center.

## For More Information

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# USDA Natural Resources Conservation Service

## Mission

The Natural Resources Conservation Service (NRCS) delivers conservation solutions so agricultural producers and forest land users can protect natural resources and feed a growing world. We achieve this by providing voluntary assistance through strong partnerships with private landowners, managers, and communities to conserve, protect, restore, and enhance the lands and waters upon which people and the environment depend.

## Relevant Agency Programs

The 2018 Farm Bill authorizes NRCS to provide financial and technical assistance through conservation programs to private landowners who want to support their working lands. Through these conservation programs, NRCS works one-on-one with farmers, ranchers, and forest landowners to implement conservation practices and systems on their working land that help address critical natural resource issues, including soil erosion, water quality and quantity, air quality, soil health, wildlife habitat, and damages caused by floods and other natural disasters.

### FINANCIAL ASSISTANCE

Through financial assistance, NRCS supports agroforestry as a land management approach by using properly designed agroforestry systems that help private landowners achieve specific natural resource goals. When appropriate, implemented practices are incorporated with agroforestry practices such as alley cropping, forest farming, riparian forest buffers, silvopasture, and windbreaks, all of which help support American working lands.

NRCS financial assistance programs supporting agroforestry include:

- ▲ **Environmental Quality Incentives Program**
- ▲ **Conservation Stewardship Program**
- ▲ **Regional Conservation Partnership Program**

### CONSERVATION TECHNICAL ASSISTANCE AND CONSERVATION PLANNING

Through conservation technical assistance, NRCS generates, manages, and shares the data, research, and standards that enable private landowners, partners, and policymakers to make land management decisions informed by objective and reliable science.

NRCS **conservation planning** helps private landowners plan and execute conservation decisions to meet land use goals. Conservation plans record decisions supporting the treatment and management of natural resources on working lands.

NRCS technical experts give advice on the best solutions to meet the unique conservation and business goals of the people growing the Nation's food and fiber. Professional advice from NRCS experts and conservation planning assistance help the Nation's private landowners make investments in their operations and local communities to keep working lands operational, boost rural economies, increase the competitiveness of American agriculture, and improve the health of our air, water, and soil.

### TECHNOLOGY TRANSFER AND ASSISTANCE

To strengthen scientific and technical support for NRCS conservation programs and activities, National Technology Support Centers (NTSCs) were established in the East, Central, and West service areas. The primary functions of these centers are to provide direct technical assistance and technology

transfer to states, the Pacific Basin, and Caribbean areas and to acquire and/or develop new science and technology to provide cutting-edge technical support.

NTSC Technology Tools include agroforestry conservation standards, specifications, guides and references, and modeling systems. NRCS uses this technology to help facilitate sound conservation decisions by private landowners.

Training and certification programs include agroforestry technical training to internal and external customers and the administration of certification standards and procedures.

Plant materials and related technologies provide for improved plant species and better agroforestry treatment.

### NATURAL RESOURCE INVENTORY AND ASSESSMENT

NRCS assesses, acquires, develops, interprets, analyzes, and delivers natural resource data and information to enable knowledge-based natural resource planning and decision making at all landscape scales. Data-gathering protocols ensure that reliable natural resource data are acquired and delivered. Databases and delivery include the maintenance and delivery of geospatial datasets and information.

Assessments and analyses include the modeling and interpretation of natural resource data to better inform decision makers and to facilitate policy development.

## Select Agroforestry Projects and Activities

The agroforestry-related conservation practice standards implemented through EQIP and CSP cover a wide range of potential landowner projects and activities. The practices implemented at each site are tailored to the landowner's goals based on the existing resource concerns. For EQIP, the conservation practice standards include:

- ▲ 311 – Alley Cropping,
- ▲ 332 – Contour Buffer Strips,
- ▲ 379 – Forest Farming,
- ▲ 380 – Windbreak/Shelterbelt Establishment and Renovation,
- ▲ 381 – Silvopasture,
- ▲ 391 – Riparian Forest Buffer,
- ▲ 393 – Filter Strips, and

- ▲ 612 – Tree/Shrub Establishment.

For CSP, the enhancements and bundles include:

- ▲ E381A – Silvopasture to improve wildlife habitat,
- ▲ E391A – Increase riparian forest buffer width for sediment and nutrient reduction, and
- ▲ E391C – Increase riparian forest buffer width to enhance wildlife habitat.

Between 2009 and 2020, the number of acres that had agroforestry practices incorporated into their land management activities was 83,876. The most common agroforestry practice implemented is Windbreak/Shelterbelt Establishment with 20,463 acres. Financial assistance to landowners is presented in the annual payment schedules. Conservation Practice Standards (CPS) payment rates are based on most recent cost estimates for materials and labor. Standards are reviewed and revised every five years. Each review includes updates to reflect current science and technological changes to ensure quality and assure environmental compliance of practices.

**Conservation Innovation Grants** support agroforestry by offering grants to encourage resource conservation (i.e., improvements in water quality, soil health, and wildlife habitat vis-à-vis agricultural productivity enhancement) through innovations on farms, ranches, and private forests. For example, the Appalachian Sustainable Development's (ASD) project titled "Increasing Landscape-Scale Adoption of Agroforestry Systems in Central Appalachia through Market-Based Incentives" is utilizing agroforestry (specifically, alley cropping and forest farming), to create reproduceable and attractive land use options focused on high-value forest botanicals. In another example, Koniag Inc. Regional Native Corporation in Alaska is leading the "Afognak Island Innovative Silvopastoral & Subsistence Management" project to empower Native people to utilize silvopastoral practices to better manage their resources. Trees Forever Inc. disseminated information on using agroforestry to combat sedimentation and nutrient loading through the "Agroforestry in Iowa: Outreach to Landowners and Resource Professionals for Long Term Reduction in Nutrient Loading" project. CIG generally funds innovative, on-the-ground conservation projects including pilot projects and field demonstrations. Grant applications are accepted from state or local governments, federally recognized American Indian Tribes, non-governmental organizations, and individuals in all 50 states, the District of Columbia, the Caribbean Area (Puerto Rico and the Virgin Islands), and the Pacific Islands Area (Guam, American Samoa, Pacific Islands Area).

## For More Information

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# USDA Rural Development

## Mission

Rural Development is committed to helping improve the economy and quality of life in rural America.

USDA Rural Development programs are administered by three agencies: Rural Housing Service, Rural Utilities Service, and Rural Business-Cooperative Service. The programs of these three agencies help rural Americans in many ways. They offer loans, grants, and loan guarantees to support economic development and essential services such as business development, housing, health care, first responder services and equipment, as well as water, electric, and telecommunications infrastructure.

Economic development is promoted by supporting loans to businesses through a variety of intermediaries, banks, and other financing partners. Technical assistance and information are provided to help agricultural producers and cooperatives get started and improve the effectiveness of their operations. Rural Development programs also provide technical assistance to help communities undertake community empowerment programs. There are also programs to help rural residents buy or rent safe, affordable housing and make health and safety repairs to their homes. Rural Development has approximately \$216 billion in its portfolio of loans.

## Relevant Agency Programs

Rural Development support for agroforestry is provided through various programs such as the Appropriate Technology Transfer for Rural Areas (ATTRA) project, **Rural Business Development Grant**, and **Value Added Producer Grants** (VAPG). Loans and loan guarantees through programs such as the **Business and Industry Loan Guarantee** provide for higher level investments in supporting producers to have access to capital for working capital, equipment, and facility construction. Some crops grown in agroforestry systems have a short shelf life or are most commonly processed before they are sold. Value Added Producer Grants help producers develop systems to effectively and efficiently sell goods in a processed form, often at a higher price. Cooperatives also play a key role in the growth of specialty crops grown in agroforestry systems, so Rural Development's Rural Cooperative Development Grant programs may also provide help for agroforestry producers in the future through support for cooperative development, marketing, or processing equipment.

## Select Agroforestry Projects and Activities

Through the programs described above, agroforestry in rural areas is being supported on multiple levels. For example, The Hawai'i 'Ulu Cooperative received a VAPG for \$104,173 for "Expanding Hawaii's market for steamed-frozen breadfruit cuts" in 2018. The VAPG was a working capital grant to expand

its line of steamed-frozen breadfruit cuts for wholesale and retail markets. Funds were used to pay for labor to produce steamed frozen breadfruit cuts and packaging; labeling and promotional expenses, including professional product

photography developing a product website and marketing materials; instore tasting demos; and a financial system for subject value-added products.

## For More Information

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# Appendix

## Listing of Agroforestry Projects by the Agricultural Research Service

### **Agroecosystem Benefits from the Development and Application of New Management Technologies in Agricultural Watersheds (NP 211)**

DESCRIPTION: Riparian forest buffers: Effect of a saturated buffer system (in which tile drainage is spread out across a riparian area) on water and air quality

CONTACT: Dan Jaynes, Timothy Parkin

LOCATION: Hamilton County, IA

### **Improving Utilization of Forages in Integrated Dairy Production Systems to Enhance Sustainable Farming Systems and Food Security (NP 215)**

DESCRIPTION: Silvopasture: Converting degraded woodlands to silvopasture with restoration of grassland bird habitat

CONTACT: Alison Duff

LOCATION: Prairie du Sac, WI

### **Integrating Remote Sensing, Measurements and Modeling for Multi-Scale Assessment of Water Availability, Use, and Quality in Agroecosystems (NP 211); Improving Agroecosystem Services by Measuring, Modeling, and Assessing Conservation Practices (NP 212)**

DESCRIPTION: Riparian forest buffers as windbreaks: Riparian tree capture of airborne pesticides from crop fields and ammonia from poultry houses, with subsequent deposition of contaminants into streams

CONTACT: Cathleen Hapeman and Greg McCarty

LOCATION: Beltsville, MD and Eastern Shore, MD

### **Long-term Management of Water Resources in the Central Mississippi River Basin (NP 211)**

DESCRIPTION: Riparian forest buffers: Effect of trees on herbicide transport and water quality

CONTACT: Bob Lerch

LOCATION: 6 sites in Missouri

### **Managing Energy and Carbon Fluxes to Optimize Agroecosystem Productivity and Resilience (NP 216)**

DESCRIPTION: Windbreaks (NE) and silvopasture (AR): Microclimate effects of trees on crop production and forage production

CONTACT: Tom Sauer

LOCATION: Mead, NE and Fayetteville, AR

### **Managing Water and Sediment Movement in Agricultural Watersheds (NP 211)**

DESCRIPTION: Riparian forest buffers: Modeling sediment trapping efficiency

CONTACT: Ron Bingner, Martin Locke

LOCATION: Batesville, MS

### **Multifunctional Farms and Landscapes to Enhance Ecosystem Services (NP 215)**

DESCRIPTION: Silvopasture and riparian forest buffers: Sustainable management of grazing in wooded riparian areas

CONTACT: Kathy Soder

LOCATION: University Park, PA



### **Sampling Invertebrate Pollinator Assemblages in Mississippi Delta Operation Pollinator Sites (NP 304)**

DESCRIPTION: Riparian forest buffers (especially wetlands): Pollinator ecology and feeding preferences

CONTACT: Katherine Parys

LOCATION: IL, WI, IN, IA, MN, MO

### **Strategies to Support Resilient Agricultural Systems of the Southeastern U.S. (NP 216)**

DESCRIPTION: Silvopasture: System productivity (animals, forage, timber) and soil carbon accumulation under grasses and trees

CONTACT: Alan Franzluebbbers

LOCATION: Golsboro, NC

### **Sustainable Agricultural Systems for the Northern Great Plains (NP 216)**

DESCRIPTION: Assessing ecosystem services of windbreaks in integrated crop-livestock systems and effects on livestock health and performance

CONTACT: Dave Archer

LOCATION: North Dakota

### **Sustainable Intensification of Crop and Integrated Crop-Livestock Systems at Multiple Scales (NP 216)**

DESCRIPTION: Riparian forest buffers: Vegetation biodiversity and pollinator habitat

CONTACT: Sarah Goslee

LOCATION: University Park, PA

### **Sustainable Small Farm and Organic Production Systems for Livestock and Agroforestry (NP 215)**

DESCRIPTION: Silvopasture: Soil mapping, forage productivity in partial shade, cattle grazing behavior and heat stress

CONTACT: Phillip Owens, Jose Franco, Amanda Ashworth

LOCATION: Fayetteville and Booneville, AR

### **Sustaining Agroecosystems and Water Resources in the Northeastern U.S. (NP 211)**

DESCRIPTION: Riparian forest buffers: Effects of riparian trees adjacent to pasture or cropland on water quality

CONTACT: Pete Kleinman, Ray Bryant

LOCATION: Susquehanna-Chesapeake watershed (mostly PA and MD)

Listing of Agroforestry Projects by the National Agroforestry Center

# Selected List of Agroforestry Projects by the National Agroforestry Center

## Agroforestry Adoption in the United States

DESCRIPTION: This study will shed light on the drivers effecting agroforestry adoption, the benefits and challenges producers face, and pertinent management and maintenance activities they conduct. The synthesis will cover each agroforestry practice individually and will result in five manuscripts in peer reviewed journals. Reviews of windbreak and silvopasture adoption have been published, with riparian forest buffers, forest farming and alley cropping to follow.

CONTACT: Matt Smith

LOCATION: National

## Agroforestry Plant Selection Guide

DESCRIPTION: Project will involve the development of an agroforestry plant selection guide, which will cover tree and shrub species in the United States and the specific functions they have that may be beneficial or problematic when utilized in an agroforestry system.

CONTACT: Gary Bentrup

LOCATION: National

## American Forest Farming Council

DESCRIPTION: This agreement supports the establishment of a new American Forest Farming Council that will help create industry standards and promote the wise management of nontimber forest products.

PARTNERS: John Munsell

LOCATION: Virginia Polytechnic Institute and State University

## Carbon Stocks in Silvopasture Systems vs. Treeless Pastures in the Northeastern United States

DESCRIPTION: Study will investigate the carbon storage capacity of silvopasture systems in the eastern United States by comparing site-level carbon storage between well-established (> 10 yr. old) silvopastures to adjacent treeless pastures. This study is a collaboration with Yale.

CONTACT: Matt Smith

LOCATION: National

## Designing More Effective Riparian Forest Buffers

DESCRIPTION: Study involved using AgBufferBuilder as an iterative tool to design more effective water quality buffers that will minimize land taken out of crop production. Additional structural constraints (e.g., tractor turning radius, field accessibility, harvest rate) along with social psychological constructs (norms, financial attitudes) were investigated.

PARTNERS: USFS NRS (Kristen Floress), Purdue University

LOCATION: Michigan

## Forest Farming Calculator

DESCRIPTION: Develop an online forest farming calculator that will assist forest farmers with business planning and loan applications.

PARTNERS: Appalachian Sustainable Development

CONTACT: Gary Bentrup

LOCATION: Eastern United States

## Forest Farming in Western Appalachia

DESCRIPTION: Create educational materials based on forest farming enterprises in Ohio and Southwest Virginia.

PARTNERS: Tanner Filyaw, Rural Action

LOCATION: Ohio and Virginia

## Impact of Riparian Forest Buffers on Streambank Erosion

DESCRIPTION: This study measured soil loss and economic costs of land with and without riparian forest buffers in the Little Blue River for long-term streambank stabilization projects, and to determine the full value of streambank stabilization with the riparian forest buffers

PARTNERS: USFS (Brice Hanberry), KS Forest Service, and Kansas State University

LOCATION: Kansas

## **Agroforestry at the Landscape Level Book Chapter**

DESCRIPTION: This book chapter is part of the 3rd edition of North American Agroforestry. It covers a range of topics related to agroforestry from a landscape-level perspective. This is the primary agroforestry textbook used in the United States.

PARTNERS: Sarah Lovell, University of Missouri, Erik Stanek

CONTACT: Gary Bentrup

LOCATION: National

## **National Agroforestry Producer Survey**

DESCRIPTION: Study involves a comprehensive follow up survey to the 2017 Census of Agriculture agroforestry question to obtain information from producers on: acres in each agroforestry practice, tree/crop/livestock species being used, establishment methods, maintenance activities, reasons why they have the practice, markets where they sell their agroforestry products, funding methods for system establishment/maintenance, preferred sources of information, etc.

CONTACT: Matt Smith

LOCATION: National

## **Pacific Northwest Agroforestry Training**

DESCRIPTION: This series of agroforestry training sessions is funded through an agreement with NAC and Oregon State University. The target audience is resource professionals who assist landowners and producers design and establish agroforestry systems in Oregon and Washington.

PARTNERS: Badege Bishaw, Oregon State University & Andy Perleberg, Washington Extension Forestry

LOCATION: Oregon and Washington

## **Partnering for Agroforestry in the Midwest**

DESCRIPTION: Develop outreach publications, videos and local meetings to promote the adoption of alley cropping and silvopasture management.

PARTNERS: Keefe Keeley and Kevin Wolz, Savanna Institute

LOCATION: IL, WI, IN, IA, MN, MO

## **Pollinators in Agroforestry Systems Systematic Literature Review**

DESCRIPTION: This **systematic review** assessed the degree to which agroforestry systems enhance pollination in agricultural landscapes.

PARTNERS: Xerces Society for Invertebrate Conservation, Jennifer Hopwood, Nancy Lee Adamson, Mace Vaughan

CONTACT: Gary Bentrup

LOCATION: National

## **Sharing Successes in Forest Farming Across Central Appalachia**

DESCRIPTION: Develop educational videos and materials portraying successful forest farming operations in Central Appalachia.

PARTNERS: Chris Burney, Livelihoods Knowledge Exchange, LIKEN

LOCATION: WV, VA, NC, KY, TN, OH

## **Silvopasture As A Mechanism to Reduce Wildfire Risk**

DESCRIPTION: Silvopasture is an intensively managed and integrated system that combines trees, forage and livestock on the same unit of land. This management system may be a suitable option for practitioners looking to reduce hazardous fuel loads on their land, while simultaneously generating short- and long-term revenue. Anecdotal evidence suggests that silvopasture management reduces fuel loads because it involves thinning trees to roughly 60 ft<sup>2</sup>/acre, pruning branches to the first sawlog, and grazing forages. However, there are few scientific studies assessing the effectiveness of this management strategy for fuel mitigation. Consequently, this study will investigate the degree to which silvopasture management can reduce hazardous fuel loads. This study is a collaboration with Washington State University.

CONTACT: Matt Smith

LOCATION: National

## **Silvopasture Producers of California**

DESCRIPTION: Develop videos, enterprise budgets and producer profiles of existing silvopasture operations to help promote the understanding and adoption of silvopasture management in California.

PARTNERS: Niki Mazaroli, Strategy Research Science

LOCATION: California



## Southwest Agroforestry Action Network

DESCRIPTION: This agreement supports the establishment of a new Southwest Agroforestry Action Network, SWANN, serving New Mexico, Arizona, Utah, and Colorado. The goal is to help create a network of agroforestry supporters and possibly direct funding toward important agroforestry issues and research needs in the SW United States.

PARTNERS: Kent Reid, New Mexico Highlands University and Ann Audrey, Arizona LEAF Network

LOCATION: New Mexico, Arizona, Utah, and Colorado

## State Property Tax Incentives for Agroforestry Phase I

DESCRIPTION: Conducted an analysis of state property taxes for five states that explores policies and programs that help or hinder agroforestry adoption.

PARTNERS: USFS SRS (Gregory Frey), North Carolina State University (Stephanie Chizmar, Rajan Parajuli, Robert Branan), USDA NRCS (Lord Ameyaw)

LOCATION: North Carolina

## Tree Advisor

DESCRIPTION: This study expanded on the [online plant selection guide](#) developed by NAC to help planners select better species of trees and shrubs to achieve a suite of user-defined purposes for an agroforestry practice.

CONTACT: Gary Bentrup

LOCATION: National

## Trees Outside Forests (TOF) Inventory & Mapping

DESCRIPTION: Key questions to investigate include: What value do these trees have for carbon sequestration? How can we use cloud-based mapping services and remote sensing to more efficiently produce map products? How much cropland is being protected by windbreaks? What are trends of windbreaks over time? How many acres are available for tree planting on under-utilized ag land? How can we assist stakeholders and decision makers through better data visualization?

CONTACT: Todd Kellerman

LOCATION: National

## Windbreaks Over Time: A Case Study of Nebraska

DESCRIPTION: To date, only two studies in the United States have tracked agroforestry adoption over time, limiting our understanding of whether producers are retaining these practices following the initial startup years. This study will build off two studies that used the same survey and sampling frame in Nebraska to assess windbreak retention and opinions of producers.

CONTACT: Matt Smith

LOCATION: National



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