EXECUTIVE SUMMARY

Forests produce the cleanest water of any land use. Forests in the Chesapeake Bay watershed once covered 95 percent of the land in the watershed. Today, only 55 percent is forested, and forests are lost to development at a rate of 100 acres per day. Restoring forest cover across urban-to-rural landscapes is a critical, cost-effective way to meet multiple goals – water quality, air quality, wildlife and fisheries habitat, and sustainable communities.

In May 2009, President Obama issued Executive Order 13508 for the Chesapeake Bay *"...to protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem."* In the resulting 2010 *Executive Order Strategy for Protecting and Restoring the Chesapeake Bay*, USDA committed to work with partners on a strategy to maximize forest restoration in priority areas across the watershed. During 2011-2012, the U.S. Forest Service coordinated teams with over 60 representatives from over 30 Federal, State, and nongovernmental organizations to craft this Chesapeake Forest Restoration Strategy. A draft of the Strategy was released in July 2012 for public review, and the valuable input received has been incorporated into this document.

The Strategy provides a roadmap to guide and expand forestry partnership efforts in the years ahead. Investments in these efforts will accomplish a number of far-reaching goals:

- The Strategy builds on earlier commitments by the Chesapeake Bay States and Federal partners to **restore riparian forest buffers at a rate of 900 miles per year** and **support community tree canopy expansion goals.**
- Tree planting on rural and urban lands, including riparian forest buffers, **is a cost-effective, long-term solution to meet Chesapeake Bay Total Maximum Daily Load targets**, while also **improving stormwater management, air quality, wildlife habitat, carbon sequestration, and community quality of life.**
- The different sections of the Strategy advance innovative and collaborative approaches to targeting restoration in areas of greatest opportunity and benefit, focusing on **wildlife and fisheries habitat, mine lands, agroforestry, urban and community forestry,** and **contaminated lands** (e.g. brownfields).

Forest restoration is a long-term endeavor that begins with planting and caring for trees—a fundamentally local, grassroots action. It is carried out in private yards and public parks and along city streets and farmland streams by the many hands that recognize the innumerable gifts that trees return to us. Community-based efforts are bolstered by strong local, State, and Federal programs that promote the planting and maintenance of trees. The benefits of forest restoration can be felt through the entire Chesapeake ecosystem—from headwaters to sea. To learn more and get involved in this partnership effort, please contact Sally Claggett (**sclaggett@fs.fed.us**) or Julie Mawhorter (**jmawhorter@fs.fed.us**) of the U.S. Forest Service, Northeastern Area State and Private Forestry Chesapeake Bay Watershed Forestry program.

SECTION 4
AGROFORESTRY

Farms and forests play a vital role in the economic, social, and ecological landscape of the Chesapeake Bay watershed. Approximately 22 percent of the watershed—9 million acres—is in agricultural land use (figure 4.1). An additional 4.2 million acres of woodlots exist on farm land in the Bay watershed. The future viability of these working lands is threatened by high rates of land conversion and development. Retaining sustainable rural landscapes and economies must be at the heart of watershed protection and restoration efforts. The positive environmental stewardship practices of farmers will be critical in reducing runoff of nutrients and sediment to local waterways. This Strategy section focuses on **using trees in strategic and innovative ways** to benefit farms and the Bay. A companion Working Lands Conservation Strategy is also being developed by USDA and partners, that is aimed at strengthening farm and forest land protection efforts in the Bay watershed.

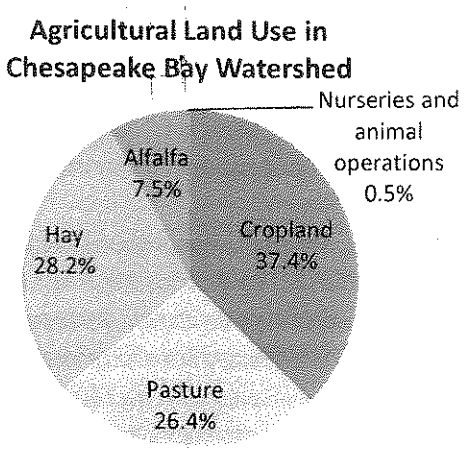


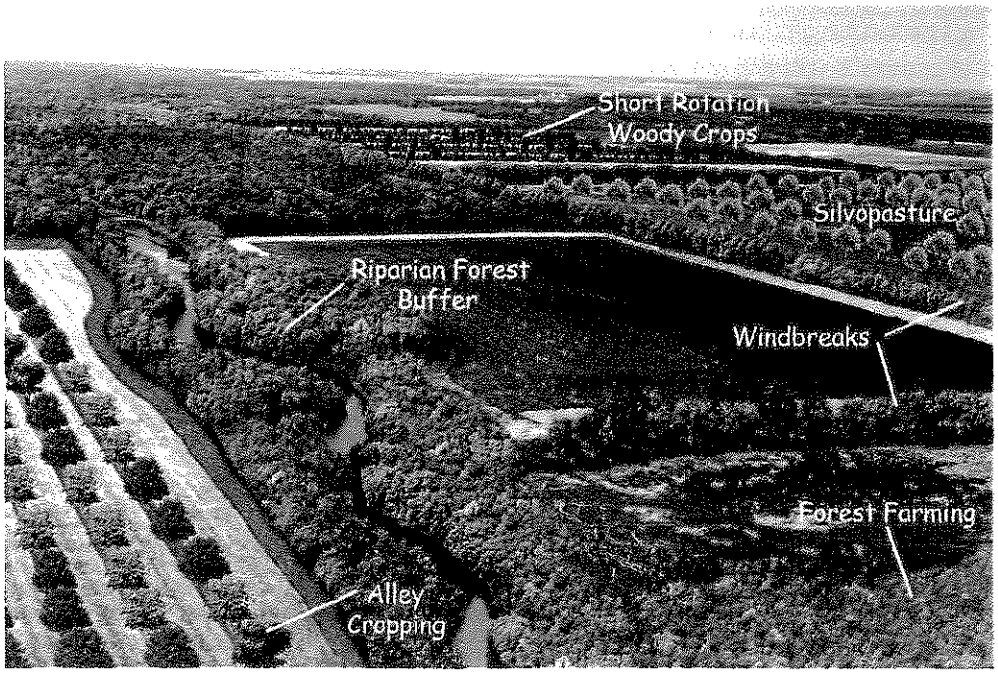
Figure 4.1. Agricultural land use in the Chesapeake Bay watershed. Source: Chesapeake Bay Program

Agroforestry is the intentional mixing of trees and shrubs into crop and animal production systems to create environmental, economic, and social benefits. – USDA Agroforestry Strategic Framework

Agroforestry practices bring together the **ecological** advantages of trees and other woody plants and the **economic** benefits associated with their products. By incorporating trees into agricultural landscapes, farmers can bolster the economic and environmental sustainability of their farming enterprise. By adopting agroforestry practices in wooded areas, landowners can receive an additional income stream that supports keeping the land in forest cover.

The USDA Agroforestry Strategic Framework (FY2011-2016) cites these benefits of agroforestry practices:

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



The USDA National Agroforestry Center provides a wealth of information about how agroforestry practices can be incorporated into working lands. Source: National Agroforestry Center

What is Agroforestry?

1) Riparian Forest Buffers
Definition: Trees and shrubs along streams and around wetlands that reduce the negative impacts of adjoining land use practices on aquatic resources.

Benefits: Improved wildlife, pollinator, and aquatic habitat. Potential economic benefits include multiple marketable products that can be grown in the buffer such as fruits, nuts, and timber. Riparian forest buffers are already a well-recognized practice within the Bay, but many streams need buffer restoration and enhancement.

2) Windbreaks/Shelterbelts
Definition: Trees and/or shrubs that mitigate the negative impacts of wind or snow.

Benefits: Protection of wind-sensitive crops and livestock, reduced snowplow costs, and shelter for homes (reduced heating costs and snow drifting, among others). Emerging benefits include capture of pesticide spray drift, reduced emissions and odor from intensive livestock production systems, carbon sequestration, and marketable wood products such as timber and biofuels.

3) Alley Cropping
Definition: Rows of trees or shrubs with one or more agricultural crops that shelter crops, increase or sustain site productivity, and diversify production.

Benefits: Nitrogen-fixing woody species can reduce the need for applied nitrogen; energy needs can be reduced through woody biofuel production; economic contributions from woody plants may include seed, fruit, nut, and fiber products. A common example of alley cropping in the Bay region is the integration of annual crops, such as pumpkins or sweet corn, with orchard tree crops.

4) Silvopasture
Definition: Integration of trees and livestock production on the same acre at the same time. Silvopastures are managed to enhance the growth and productivity of both the overstory trees and the understory forage vegetation while also providing shelter for livestock.

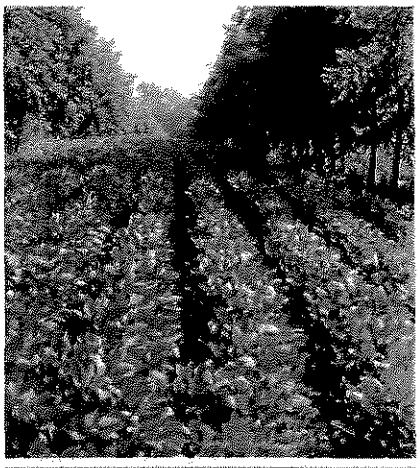
Benefits: Establishing silvopasture on steep, marginally productive, and highly erodible pasture and cropland can enhance both water quality and farm profitability. Silvopasture may also increase biodiversity and provide shelter, cover, and food for wildlife species.

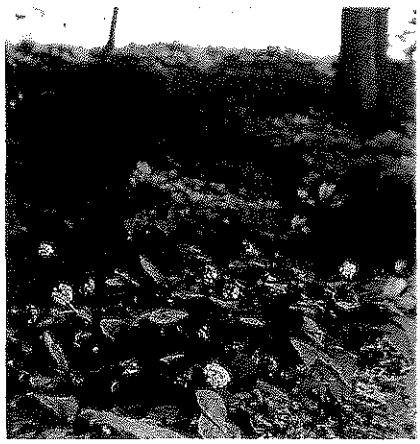
5) Forest Farming/Multistory Cropping
Definition: Cultivation of edible, floral, medicinal, and craft crops underneath a forest canopy. Common understory crops include ginseng, goldenseal, and other valuable medicinals as well as edible ramps and mushrooms.

Benefits: Increased economic viability of forest land by providing annual or short-term income as timber matures. Provides an incentive for forest landowners to address issues such as forest health, overstocked stands, invasives, lack of forest regeneration, and excessive deer browse.

Special Applications – Short Rotation Woody Crops
Definition: Fast-growing tree species, such as poplars and willows, that are grown for biofuels using agronomic techniques in open fields.

Benefits: Numerous environmental and economic benefits, including energy independence and local job creation. The Bay watershed has thousands of acres of idle or marginal land that could support these woody crops.





Windbreak (top), alley cropping (upper middle), silvopasture (lower middle). Source: NRCS. Forest farming/ginseng (bottom). Source: Bill Slagle

Agroforestry practices can be applied throughout the watershed to provide benefits to landowners and the Bay.

Landowner outreach, technical assistance, and incentives for agroforestry should be focused in areas that have the greatest need and present the greatest opportunity. The Natural Resources Conservation Service has selected priority watersheds for supplemental cost-share funding of voluntary conservation practices through the Chesapeake Bay Watershed Initiative (figure 4.2). These priority watersheds represent areas that have the highest runoff of nutrients and sediment into the Bay. Riparian forest buffers and other agroforestry practices should be focused in these areas to accelerate Bay restoration efforts.

State forestry agencies in Maryland and Virginia have been working with partners to target riparian forest buffers at the county level using GIS tools. These analytical tools identify areas where forest buffers are most needed and would yield the greatest water quality benefits. Analysis results help guide outreach and technical assistance to landowners who are interested in incentive programs.

Carrying out other agroforestry practices such as windbreaks, silvopasture, alley cropping, and forest farming will depend largely on farm characteristics and landowner goals. Counties with a high concentration of pasture land (figure 4.3) provide a good starting place for silvopasture education and pilot initiatives. Areas with high poultry production are a good place to promote windbreaks, or "vegetative environmental buffers," to manage air emissions and odors.

Agroforestry initiatives should be closely aligned with programs to protect working lands from development through conservation easements and other mechanisms. Targeting restoration on permanently protected working lands helps to ensure that investments will not be lost due to land development.

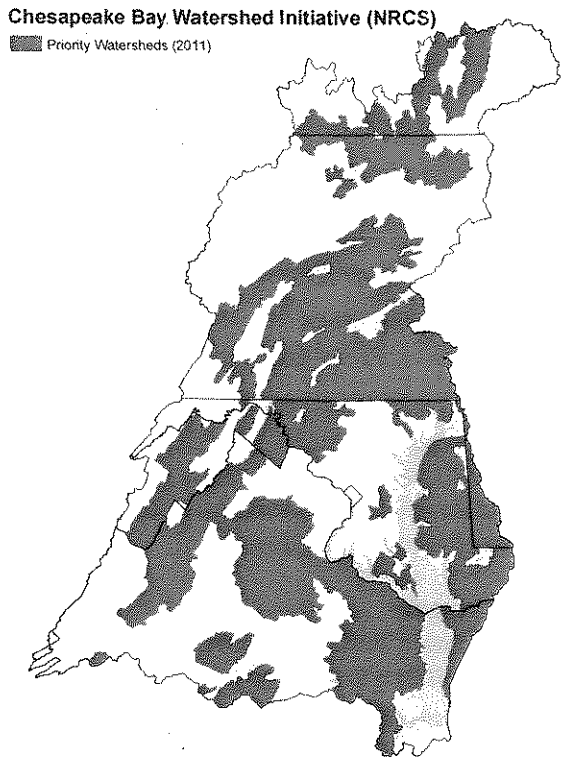


Figure 4.2. Priority watersheds for Chesapeake Bay Watershed Initiative agricultural cost-share funding (FY2011). Source: NRCS

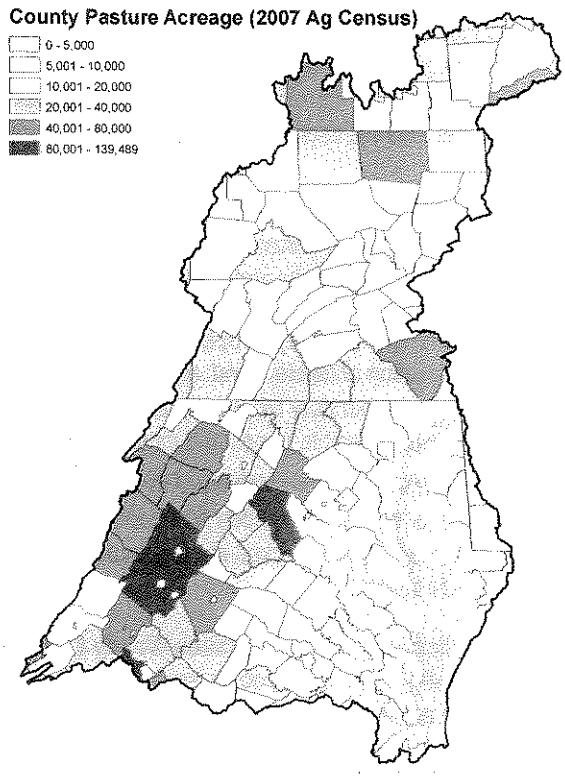


Figure 4.3. Acreage of pasture by county within the Chesapeake Bay watershed using 2007 USDA Census of Agriculture data. Source: Chesapeake Bay Program

The USDA Natural Resources Conservation Service (NRCS) provides **financial assistance** to establish agroforestry practices through Farm Bill programs such as the Environmental Quality Incentives Program, Wildlife Habitat Incentive Program, and the Conservation Stewardship Program. Cost-share and rental payments to establish riparian forest buffers are available through the Conservation Reserve Enhancement Program and Conservation Reserve Program, both of which are administered by the USDA Farm Service Agency (see also p.34). Additionally, State and local programs exist in some areas to promote these practices. Because incentives vary by State, information can be found online and at local USDA Service Centers. **Technical assistance** for installing agroforestry practices is available from NRCS, State forestry agencies and consulting foresters, and local Soil and Water Conservation Districts.

Although cost-share assistance for forest buffers and tree/shrub establishment has long been available, the term "agroforestry" and some of its practices are still relatively new to many agricultural producers and professionals in the region. To address this gap, agency partners in Pennsylvania have been proactively raising awareness about agroforestry and promoting its many benefits:

- **Agroforestry Workshops** were held in 2011-2012 to target producers, landowners, and natural resource professionals and focus on silvopasture, forest farming, buffers, and windbreaks. The Pennsylvania Department of Conservation and Natural Resources (PA-DCNR) Bureau of Forestry sponsored the workshops in cooperation with the NRCS, Penn State University, Cornell University, Shaver's Creek Environmental Center, and the Pennsylvania Association for Sustainable Agriculture.
- An **agroforestry demonstration site** is being developed at Dickinson College Farm through a PA-DCNR Bureau of Forestry grant from the U.S. Forest Service.
- The NRCS in Pennsylvania **updated its technical guidance** to include agroforestry practices. Its guidance includes standard criteria for the five main agroforestry practices, financial program payment scenarios for windbreaks and riparian forest buffers, a Tech Note for establishing windbreaks around poultry production facilities, and Conservation Stewardship Program guidance about planting trees and shrubs that provide edible products.
- The NRCS in Pennsylvania also added Forestry and Agroforestry categories to its **Conservation Innovation Grants program** that solicit demonstrations of alley cropping, multistory cropping, adding short-rotation woody biomass to annual crop rotations, direct tree seeding methods, and establishing pollinator habitat in forest edges.
- The PA-DCNR Bureau of State Parks obtained a grant to conduct a **pilot "goats in the woods" project to remove invasive vegetation** at King's Gap Environmental Education Center in Cumberland County.

These partnership initiatives provide a great model and foundation for promoting agroforestry practices more broadly across the Bay watershed in the years ahead.

An innovative example of silvopasture in Maryland is the use of "eco-goats" to remove damaging invasive plants from woodlands and fields. The goats shown here are munching on oriental bittersweet at the forest edge. Source: Brian Knox, Eco-Goats

Agroforestry in Action

The Catawba Sustainability Center (CSC) is a 377-acre tract of farm and forest land nestled in the Catawba Valley in the Upper James River Basin in southwestern Virginia. The CSC is an Outreach and International Affairs initiative of Virginia Tech University. At the CSC, community members, students, and other stakeholders collaboratively learn about agroforestry in a setting focused on both economic growth and environmental stewardship. It is a property in the Chesapeake Bay headwaters that has over 2 miles of the Catawba Creek flowing across its landscape.

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

Actions

Work with NRCS State Technical Committees in Bay States to **promote agroforestry practices through Farm Bill programs**.

Agroforestry is a relatively new concept. **Train-the-trainer workshops** that target resource professionals in the watershed are a first step toward reaching watershed landowners. Subsequent workshops can introduce agroforestry practices to landowners.

Establish **agroforestry demonstration areas** by finding early adopters with working farms and forests so that others can see the conservation and economic benefits of agroforestry practices. Pursue **USDA Conservation Innovation Grants** and other funding sources to establish these sites.

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

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

Design and implement **agroforestry research projects** to ensure stakeholders have access to cutting-edge and regionally relevant science.

Expand application of agroforestry practices and innovations to **small-scale landscapes, including urban settings**.

Students and community members plant woody florals at the Catawba Sustainability Center to demonstrate crops that can be used in agroforestry riparian plantings. Source: James Chamberlain