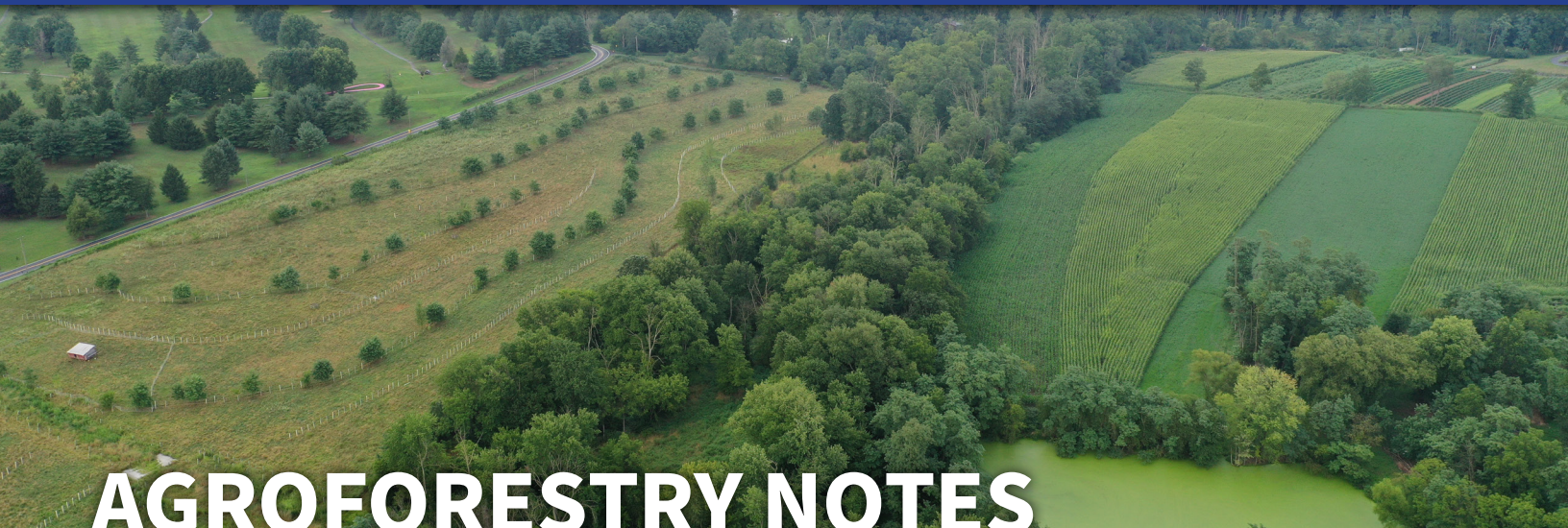




AGROFORESTRY NOTES

Landscape Planning for Environmental Benefits

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Introduction

Agroforestry is most often implemented at the scale of the individual farm. A producer may choose to establish agroforestry for many reasons, such as to supplement income, provide shade for livestock, or create wildlife habitat. The root causes of many natural resource concerns, however, are typically best addressed across multiple land ownerships at the scale of watersheds or beyond. If incorporated into strategic, landscape-level planning, agroforestry can contribute to many conservation, restoration, production, and sociocultural benefits in the interest of the broader public.

At scale, agroforestry systems can link habitat patches within a wildlife corridor, reduce nutrient and sediment pollution across a watershed, mitigate the impacts of flooding and weather extremes, enhance local and regional economies, and contribute to a healthier food supply (Lovell et al. 2022). Achieving the potential benefits of agroforestry across landscapes requires looking beyond property and administrative boundaries. Biophysical processes—such as wildlife migration or the transport of pollutants through a watershed—unfold across large spatial and temporal scales. Agroforestry may be one tool in a suite of practices that can impact these processes to achieve desired outcomes. Determining where and how to implement agroforestry within a broader landscape conservation initiative requires careful planning and collaboration

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A note about scale

What constitutes a landscape can be hard to define. Landscapes are spatially and temporally heterogeneous, meaning they vary across space and change over time. Where the bounds of a landscape are drawn matters less than the processes that occur within that landscape and how those processes interact. For natural resource professionals, how a landscape is defined can vary depending on a particular resource concern or conservation objective. For example, if improving water quality is the goal, then individual sites are evaluated in relation to the larger watershed. To enhance wildlife habitat, sites are evaluated in relation to existing habitat and migration routes for specific species or groups of species. Landscapes are also more than their biophysical components. Administrative boundaries and guidelines, policies and laws, and economic and cultural factors are often just as relevant to large-scale planning efforts as landscape structure and ecological function.

Objectives

The opportunity to take a landscape perspective often lies with conservation organizations and government agencies at the State, Federal, Tribal, and local levels, which pursue a variety of objectives at larger geographic scales. These conservation initiatives often seek to address environmental and public health problems facing broader communities like degraded water quality and food insecurity, as well as ecological concerns such as habitat fragmentation and biodiversity loss. While land managers have unique personal, temporal, and financial considerations specific to the farm, planners and natural resource professionals often seek the greatest public benefit across large areas. How can agroforestry contribute to these different objectives at vastly differing scales?

This note is intended to help agricultural and natural resource professionals identify opportunities to incorporate agroforestry into initiatives to address landscape-level challenges. It may also help conservationists better understand how agroforestry systems' production and conservation functions may be well suited to a range of landscape-scale objectives.

Benefits and Challenges

Agroforestry systems are multifunctional, meaning they can deliver multiple conservation, production, and/or cultural benefits simultaneously. Multifunctionality creates unique opportunities to align the site-specific goals of individual land managers—which may be financial or personal in nature—with larger conservation and production objectives in the public interest. To plan and design agroforestry systems that meet goals across scales is easier said than done. Strategic planning is complicated and requires collaboration among diverse stakeholders with a range of interests, perspectives, personal experiences, and biases.

Below are some of the potential benefits of coordinating agroforestry at the landscape scale, as well as some common challenges of integrating knowledge and resources across scales.

Benefits:

- Strategically targeting agroforestry can make more effective and efficient use of public or other funding to achieve conservation objectives.
- Involvement of diverse stakeholders can strengthen the planning process and ensure a range of objectives in the public interest are addressed. This is particularly important when implementing agroforestry because of its integrative, interdisciplinary nature (for example, natural science and socioeconomic considerations).

- Working with a range of partners across a landscape can help identify, account for, integrate, and build on existing planning efforts at different scales (local, State, Tribal, Federal), thereby avoiding duplication of efforts and improving synergy.
- A landscape approach is more likely to result in more technically sound, resilient projects at both the landscape and site level.
- Landscape-scale projects that feature agroforestry may build public understanding of—and investment in—agroforestry through increased visibility, coordination, and efficacy.
- Framing agroforestry system functions in a landscape context helps land managers visualize the landscape they are working in and understand how their actions affect neighbors and ecosystems.

Challenges:

- Working at the landscape level requires coordination among diverse stakeholders with different goals, perspectives, biases, strategies, funding sources, and timelines. It requires participation of partners with a wide range of skills and knowledge, a coalition which may be hard to assemble. This is particularly relevant because of agroforestry's production and conservation components.
- It is important to define the landscape of interest at a large enough scale to encompass relevant biophysical processes and administrative boundaries but not too large to impede effective action or stakeholder engagement.
- Landscape-scale initiatives have long timelines and can be costly, with little return in the short term. This has implications for partner organization or agency staff who come and go from important roles, for funding deadlines, and for land managers whose needs and goals may involve different timelines.
- Without a long-term strategy and adequate resource allocation, monitoring and evaluation of success may fall by the wayside, limiting lessons learned.

While landscape-level thinking and collaboration among organizations can help produce plans that might achieve environmental and social benefits, those benefits often cannot materialize without buy-in from private land managers. Agroforestry may help these groups connect objectives across scales, broaden ideas of what is possible, and find shared interests.

Agroforestry systems can be a bridge for considering options across land uses that can knit together ownerships and sources of knowledge in response to landscape-scale conservation challenges. [Forest farming](#), for example, can be a pathway to working with forest landowners who are also farmers and do not currently actively manage their woods (Feibel et al. 2024). According to the 2023 National Woodland Owner Survey, 18 percent of family forest owners indicated that nontimber forest products are a “very important,” “important,” or “moderately important” reason for owning forest land, totaling 1.9 million ownerships (USDA Forest Service 2026). This indicates a potential opportunity to engage with landowners in ecologically significant areas on the benefits of keeping forest intact and actively managing for ecological and economic benefits.

What is landscape planning?

In the environmental context, landscape planning is based in the principles of landscape ecology—the study of the biological, physical, and human interactions within a geographic area. Landscape ecology encompasses the spatial patterns of landscape elements (landscape structure) and things that move across the landscape (e.g., wildlife, water, nutrients), how the landscape functions (the flows of things between landscape elements), and changes in the landscape over time. Key structural elements in a landscape include the dominant land cover (the matrix), discrete blocks of habitat or land cover (patches), and linear features such as riparian corridors (fig. 1).

It is important for natural resource managers to understand principles of landscape ecology because many environmental processes unfold over large geographic areas and are impossible to examine at the local perspective. In addition, addressing landscape-level environmental problems requires planning at scales that match the underlying ecological processes.

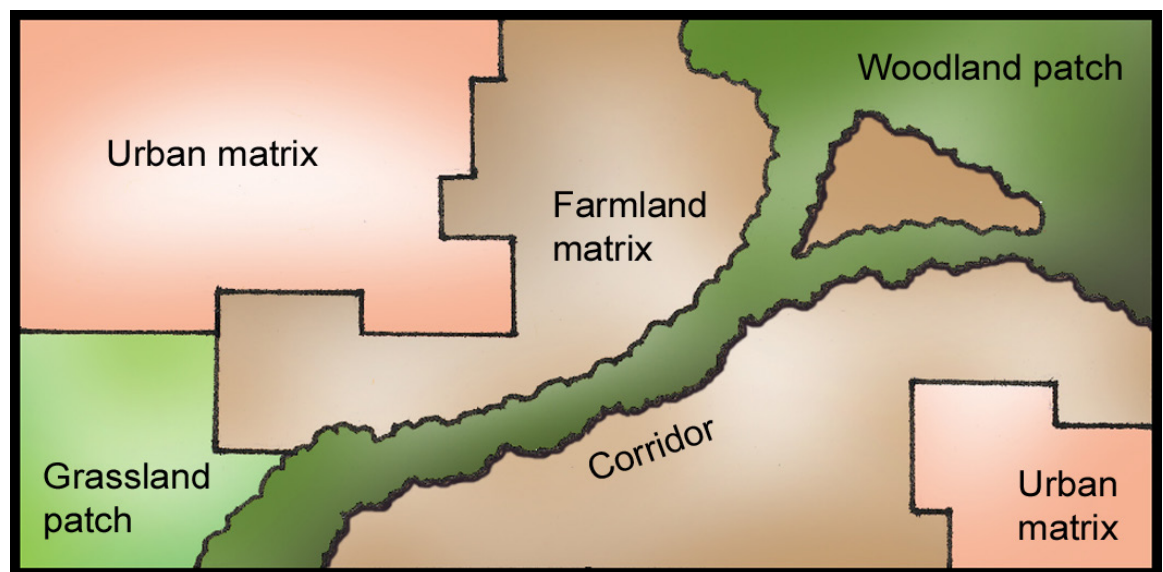


Figure 1—This graphic illustrates different types of landscape structure in a human-dominated landscape. The urban landscape matrix gives way to farmland as the dominant land cover, through which a wooded corridor connects woodland and grassland patches that contain different plant and animal communities than the surrounding matrix. Forest Service graphic by Gary Bentrup.

How does agroforestry fit in?

Agroforestry practices create new landscape elements that affect the biological, chemical, and physical processes that occur in the landscape. These new elements create either patches or corridors that are different than the dominant land cover of an area, which may be cropland, forest, urban development, or other more homogenous land cover. Corridors created through agroforestry practices may support species that provide important ecosystem services. For example, many birds and bats that nest and roost in corridors such as riparian buffers and windbreaks consume harmful agricultural pests, while other bird species that are valuable as game offer recreational opportunities and supplemental income. Because all agroforestry systems integrate multiple herbaceous and woody species at different strata, combining species with different flowering times throughout the growing season can create diverse habitat niches for pollinators (USDA NAC 2016).



A riparian buffer in the establishment stage along a stream on a Lancaster County, PA, farm. Rows of corn give way to three rows of tree tubes lining the stream on each side, with grasses and perennial vegetation shading the water. The tree tubes protect tree seedlings as they mature. Courtesy photo by Sam Feibel.

In any landscape—forested, cultivated, or otherwise—effective environmental management involves attending to both the biophysical processes within the ecosystem and the resources that communities rely upon. These include agricultural crops, timber, and other resources, as well as cultural resources such as recreation, aesthetic value, and spiritual connections.

Agroforestry is especially suited to fit into landscape conservation plans because it integrates ecological, agricultural, economic, and often social and cultural functions. This multifunctionality mirrors the reality of ecosystems, which shape—and are shaped by—human communities. Not all landscape-scale conservation objectives can be achieved through the implementation of agroforestry, however. More often, agroforestry practices may be part of a larger suite of conservation practices that can advance landscape-scale outcomes.

In the Lower Mississippi Alluvial Valley, for example, agroforestry has been identified as one approach to restore some of the ecological functions of bottomland hardwood forests, which have been drastically diminished due to land clearing for agriculture and development (Dosskey et al. 2012). Forest fragmentation, sedimentation, altered hydrology, invasive plants, uncontrolled timber harvesting, and other factors have contributed over many years to a decrease in the wildlife habitat and ecosystem services that remaining patches of bottomland hardwood forest can provide. Marginal agricultural land has been a major target of bottomland hardwood restoration efforts because it is often difficult and less profitable to cultivate. Agroforestry systems in the region can provide income from improved yields of adjacent crops, nontimber forest products, biofuel feedstock, sawtimber and pulpwood, hunting and recreation leases, and emerging carbon and ecosystem service

markets. These systems may also be adapted to wet areas and periodic flooding and may therefore appeal to land managers as an alternative to row crops and timber harvesting on marginal lands (Dosskey et al. 2012).

In terms of their ecological functions, agroforestry corridors could connect small bottomland hardwood forest patches across cropland to help wildlife move through the landscape, increasing the habitat viability of numerous small forest patches. While agroforestry corridors likely cannot provide the same habitat quality as mature bottomland hardwood forests, the fast-growing tree species often used in agroforestry systems can provide critical habitat much sooner than slow-growing hardwoods, and some bird species of high conservation priority can benefit from the management-related disturbance involved in agroforestry (Dosskey et al. 2012).

Implementing agroforestry in any landscape context can create a complex system of interactions that require management to sustain desired outcomes. The environmental impacts of agroforestry systems—intended and unintended—are numerous, change over time, and occur onsite and offsite (Bentrup et al. 2005). Landscape planning can guide where and how agroforestry can be implemented for maximum impact. A well-designed landscape plan serves multiple purposes: It indicates how effective agroforestry might be at addressing landscape-scale problems, provides options to land managers interested in conservation practices, identifies tradeoffs, and can lead to agroforestry site designs that achieve both land manager and regional benefits.

Components of Landscape Planning

Technical methods and tools

Because of the complexity and scale of landscape processes and the sheer number of variables to account for, spatial analysis is an invaluable tool to help landscape planners identify opportunities to locate and design agroforestry systems and evaluate overlapping objectives and tradeoffs. Geographic information systems (GIS) allow practitioners to map land use, soil and vegetation characteristics, topography, hydrology, habitat connectivity, and many other variables. By overlaying and contextualizing datasets, planners can better understand the landscape and identify areas where agroforestry can deliver multiple benefits simultaneously while minimizing negative impacts.

Spatial analysis can help identify high-priority sites across a watershed where conservation practices may achieve the largest pollutant reductions. For example, improvements in the quality of remotely sensed datasets, such as airborne light detection and ranging (LiDAR), have made it possible to detect change in streambank erosion at the site level, enabling identification and mapping of erosion “hotspots” across entire watersheds (Fleming et al. 2019). Such datasets can help identify areas where restoration or streambank stabilization may be most impactful, giving natural resource professionals the data they need to evaluate where agroforestry or other best management practices may be well suited. This information can also provide an opening to engage with land managers in high-priority areas.

In one of the earliest examples of landscape-scale spatial analysis for agroforestry placement, planners in the New Deal’s Prairie States Forestry Project used data on precipitation, wind, soil, vegetation, land value, and other variables to optimally place and design more than 18,600 miles of windbreaks to combat Dust Bowl erosion in the 1930s (fig. 2) (Lovell et al. 2022). More recently, researchers have conducted national-level analysis

to identify locations on the landscape most suitable for some alternative perennial crops common to agroforestry systems, such as apple (*Malus* spp.) and chestnut (*Castanea* spp.) (Shea and Wolz 2024). By integrating ecological, economic, and social data, spatial analysis can support cost-effective planning that aligns with a range of objectives.

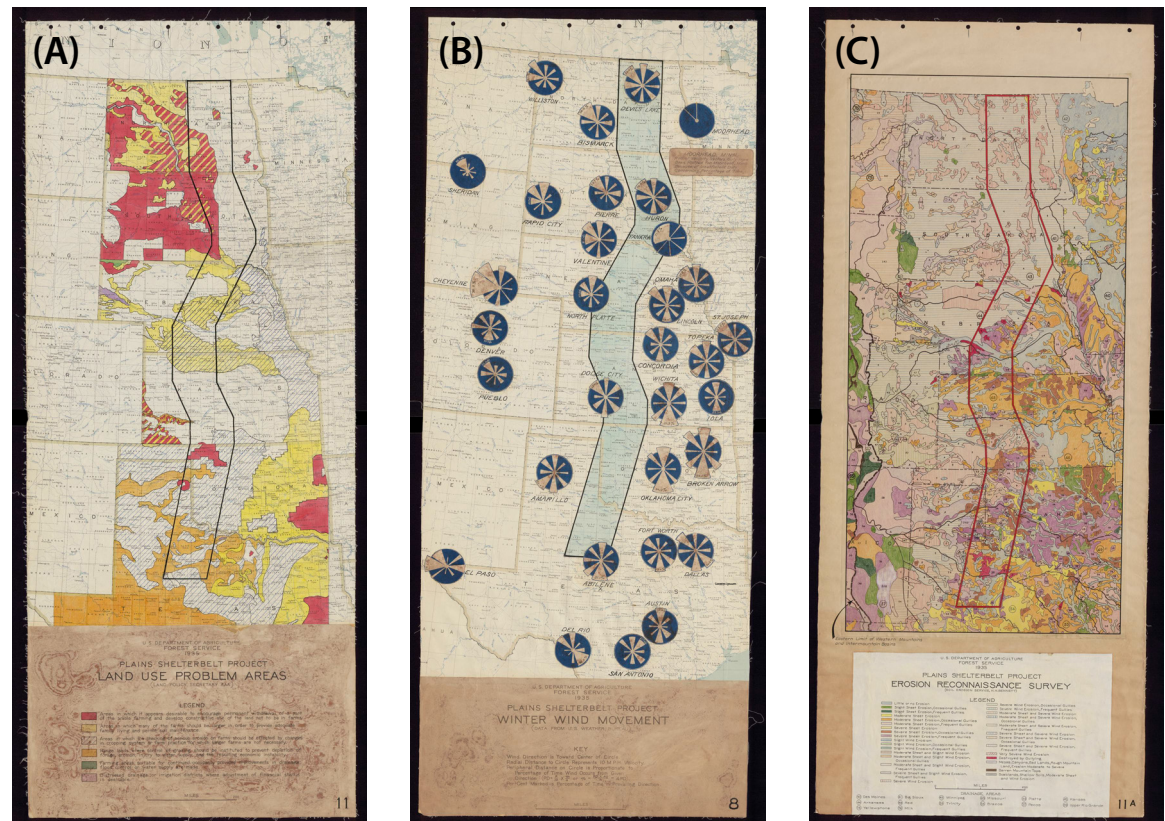


Figure 2—Maps showing (A) land use problem areas, (B) winter wind direction, and (C) soil erosion across six States. These and other maps were evaluated together as part of the Prairie States Forestry Project to identify ideal locations to plant shelterbelts (Prairie States Forestry Project, n.d.). Forest Service image/Prairie States Forestry Project Digital Archive.

A decision process for landscape planning

Plans may be well informed by spatial analysis, but whether they produce meaningful and durable outcomes depends on the care taken in the planning and decision-making process. Landscape-level natural resource challenges are inherently complex and interdisciplinary; to effectively address them requires solutions that account for the whole context of a given problem, not simply its more easily defined biophysical components. To achieve the potential public benefits of agroforestry at the landscape scale, therefore, depends not only on technical considerations like practice design and siting but also on how decisions are made, who participates, and how stakeholders and institutions coordinate action.

The decision-making process outlined below follows the framework first developed by Harold Lasswell (Lasswell 1956) and further refined and applied to natural resource management by Susan G. Clark (Clark 2002, 2010). Natural resource professionals interested in supporting agroforestry at the landscape level can use this framework to better understand how communities make decisions about natural resource management and where they as individuals may fit into the puzzle to improve the planning process. It offers a way to understand the values held by diverse stakeholders and may help those in positions to implement agroforestry at scale evaluate tradeoffs and find compromise.

This simplified list of decision-making functions emphasizes agroforestry-related considerations. It is not a list of sequential stages, as they are often carried out simultaneously, continually, and by many stakeholders (Clark 2002).

Function 1. Intelligence (planning): assessing the landscape and understanding the problem

Objective: Identify and analyze key problems, opportunities, and constraints at appropriate spatial scales and communicate information to stakeholders involved in decision making.

For agroforestry, intelligence gathering often integrates:

- Biophysical conditions (soils, hydrology, land cover, habitat connectivity)
- Agricultural production and market considerations (labor, equipment, market access)
- Social and institutional context (land tenure, community trust in public or private institutions, cultural attitudes toward agroforestry, regulatory and legal constraints)

The multistate project “Increasing Landscape-Scale Adoption of Agroforestry Systems in Central Appalachia Through Market-Based Incentives” offers an example of intelligence gathering. Led by the nonprofit Appalachian Sustainable Development with university, nonprofit, and government partners including the U.S. Department of Agriculture (USDA), Forest Service’s National Agroforestry Center, the project took place across six States in the Central Appalachian region. The goal was to conserve threatened forest ecosystems and regenerate cropland by creating financial incentives that encourage forest farming and alley cropping adoption among landowners eligible for USDA Natural Resources Conservation Service financial incentives (Appalachian Sustainable Development, n.d.).

Intelligence gathering began with tabling events and workshops to expand the network of applicants interested in agroforestry. This was followed by 86 site visits to evaluate site conditions for forest farming and to understand land manager goals. As the project advanced, demonstration sites and farm tours provided peer-to-peer learning opportunities. Interviews shed light on market opportunities and constraints, as well as management challenges. Project partners also worked with forest farmers and botanists to develop a protocol for gathering baseline forest botanical plant population data to help land managers and technical service providers understand ecological conditions and assess regeneration over time.



Black cohosh (*Actaea racemosa*), grown in a forest farm, drying at the Appalachian Harvest Herb Hub in Duffield, VA, to meet secured demand. Courtesy photo by Katie Commender, Appalachian Sustainable Development.

Function 2. Promotion (open dialogue): framing agroforestry in the public interest

Objective: Communicate to land managers, communities, and decision makers the ways in which agroforestry may or may not address observed problems and identify policies to implement agroforestry at the appropriate scale.

Successful promotion involves active and open debate about alternative approaches to address a landscape-scale problem, which may or may not include agroforestry. Through this function of the decision process, natural resource professionals can begin to assess the values held by different stakeholders as they advocate for one approach over another.

Due to its multifunctional nature, agroforestry is prone to be interpreted differently depending on how it is framed. For example, it may be presented as a conservation practice, production system, climate-resilient infrastructure approach, means of cultural or community land stewardship, or all of the above. In addition, different stakeholders will have different ideas of how agroforestry may or may not address their goals, or how agroforestry systems should be designed. In the case of riparian buffers, for instance, the general public and academic stakeholders may prefer wider, more extensive buffers, while farmers tend to prefer narrower buffers (Sullivan et al. [2004] cited in Bentrup et al. [2012]). This may be due to economic concerns farmers have about taking land out of production, practical concerns about tree management and labor requirements, or aesthetic preferences.

Function 3. Prescription (selection): making decisions and commitments about an approach

Objective: Articulate goals, develop programs and commit resources, delegate authority, formulate rules and norms, and establish guidelines for action that are broadly accepted.

Prescription involves setting a course of action following debate over proposed approaches to an environmental problem. If the selected plan or approach does not involve input from those who will be affected, it may inadequately address the problems or create unintended consequences. Examples of prescription in landscape-scale initiatives involving agroforestry could be decisions to establish urban food forests or riparian buffers along city waterways to address problems such as food insecurity, lack of green space, stormwater runoff, or the urban heat island effect.

When engaged in prescription, natural resource professionals developing a landscape plan may find the principles of adaptive governance useful to ensure the plan adheres to a community's standards of operation, which often include transparency, timeliness, fairness, and respect (Clark et al. 2010). Adaptive governance is an approach to natural resource management that aims to develop practical, collaborative solutions focused not only on substantive issues but on the procedural norms of the community as well. It recognizes the central role that context and human social relations play in conservation planning, particularly at scale.

Function 4. Application (implementation): coordinating decisions and enacting programs and policy

Objective: Implement the prescription across multiple land uses and ownerships in a coordinated manner.

Through application, stakeholders resolve disputes over how (and under whose authority) the prescription will be implemented (Clark 2002). In the context of landscape planning, this means implementing programs or management plans at scale and enforcing a set of policies to achieve the desired outcomes.

Landscape-scale initiatives often involve multiple partnerships, including public-private partnerships, which may require detailed business plans prior to implementation. Such a plan includes clearly articulated objectives, a mutually agreed-upon scope, and implementation and marketing strategies, among other components (NAASF 2011). Plans that clearly articulate agreement terms, roles for each party, and provisions to handle modifications and disputes will help avoid challenges during implementation.

Function 5. Appraisal (monitoring): evaluating and learning

Objective: Assess outcomes and improve future decisions.

Appraisal is the assessment of a landscape-scale initiative in achieving its stated goals. It may also include assessment of the entire decision process to identify strengths and weaknesses. Appraisal offers an important opportunity for learning, adjusting, and recommending how future initiatives can be made more effective. Monitoring and evaluation will be easier and more fruitful if partners clarify metrics (what will be measured), capacity and roles (who will make the measurements), and when measurements will be made early in the decision process.

Function 6. Termination (succession): adapting or moving on

Objective: Modify or discontinue ineffective approaches.

Termination involves ending programs or policies that have succeeded in reaching their goals, or canceling or adjusting unnecessary or ineffective programs and policies (Clark et al. 2010). Termination can be made easier and more effective by establishing clear goals and benchmarks of success at the outset of the decision-making process and by devoting adequate time and resources to regular appraisal of progress and outcomes. Still, an explicit process for termination should be developed at the outset of a landscape-scale conservation initiative. Although it is extremely important, termination is often an overlooked step in the decision-making process (Clark 2002).

At the farm level, individual agroforestry systems can be adapted as landscapes, markets, and climate conditions change. Termination at this scale can involve redesign rather than abandonment. Likewise, how agroforestry fits into landscape plans can be adjusted. The Forest Service's [Adaptive Management](#) planning cycle provides an example of a data-driven, results-oriented process for terminating ineffective implementation strategies (USDA Forest Service, n.d.). The cycle starts with inventorying conditions and identifying problems, creating goals and objectives, developing and selecting alternative implementation activities, monitoring conditions and evaluating progress, and adjusting implementation based on what monitoring reveals. It is important to note, however, that this cyclic process has no end point, and it is sometimes necessary to terminate programs or policies entirely rather than adjusting.

Partnerships for Landscape Planning

Successful landscape planning initiatives involve cooperation between many stakeholders including private landowners; local, State, and Federal governments; conservation organizations; universities; volunteer groups; and neighborhood associations. Every community is unique, with different local, regional, and State institutions operating under different mandates with different resources. Therefore, not all key partners will be discussed here. Broad-based partnerships provide the necessary public support, knowledge, funding, and skills to meet the diverse needs of communities and achieve landscape-scale outcomes.



Multiple individuals survey several agroforestry practices, including a multifunctional riparian forest buffer and forest farming systems, as well as other conservation practices across a Virginia landscape. Courtesy photo by John Munsell, Virginia Tech.

Producers and natural resource professionals often work together to implement agroforestry. The following list highlights key organizations and entities commonly engaged with individual producers in conservation work that may involve agroforestry at different scales across the United States. Some organizations have personnel explicitly tasked to work with land managers on projects at the farm or ranch scale, while others engage more often in landscape-scale initiatives. Understanding the mandates and capacities of these organizations can help natural resource professionals plan for collaboration. It can also help clarify when agroforestry may or may not suit the common interest of multiple stakeholders.

Natural Resources Conservation Service (NRCS)

NRCS provides conservation planning and design guidelines and region-specific technical assistance to private land managers who voluntarily adopt and implement conservation practices. Some common natural resource concerns—as defined by NRCS—that land managers can address with agroforestry include: air quality emissions, aquatic habitat, concentrated erosion, degraded plant condition, field pesticide loss, field sediment, nutrient and pathogen loss, inefficient energy use, livestock production limitations, soil quality limitations, terrestrial habitat, weather resilience, and wind and water erosion (Cartwright et al. 2022). NRCS conservation planners and Technical Service Providers typically offer site-specific technical assistance rather than coordinating landscape-scale efforts. However, NRCS conservation planners may also engage in areawide planning, which requires the involvement of interdisciplinary teams of specialists (USDA NRCS 2021).

Areawide plans involving agroforestry may begin with a successful project on a single farm, such as a riparian buffer or windbreak, which attracts the interest of neighboring producers or community members who then seek NRCS assistance to implement similar practices. Gradually, a system of corridors may develop across a watershed, with NRCS and other planners working to integrate individual projects to maximize wildlife habitat or optimize other ecological functions.

- **Geographic focus:** National, State, and local implementation, primarily at the site scale
- **Key personnel:** Conservation planners
- **Core duties:** Conservation technical assistance, financial assistance
- **Economic tools:** Financial assistance programs ([Environmental Quality Incentives Program](#), [Conservation Stewardship Program](#)), rental and easement programs ([Agricultural Conservation Easement Program](#)), grants and partnerships ([Regional Conservation Partnership Program](#), [Conservation Innovation Grants](#)). Administered by the USDA Farm Service Agency but often implemented by NRCS, the [Conservation Reserve Program](#) and [Conservation Reserve Enhancement Program](#) are additional, long-term rental programs often used to implement agroforestry practices on highly erodible and environmentally sensitive agricultural land.
- **Landscape-scale opportunities:** Programs such as [Landscape Conservation Initiatives](#) and the [Joint Chiefs' Landscape Restoration Partnership](#) (NRCS and Forest Service) and areawide planning approaches

Conservation districts

Conservation districts play a key role in connecting local priorities with State and Federal resources. Like NRCS, they often work directly with individual producers, but they are also central to locally led conservation efforts. Through the [Locally Led Conservation process](#), conservation districts collaborate with NRCS and State conservation agencies to convene landowners, community members, and partner organizations to identify priority resource concerns and guide conservation investment and action at the local level.

- **Geographic focus:** County to regional
- **Key personnel:** District managers, conservation planners
- **Core duties:** Local conservation assistance, outreach, project coordination
- **Economic tools:** Grants, financial assistance
- **Landscape-scale opportunities:** Facilitating collective action at the local level toward shared resource goals; identifying Federal, State, local, and nongovernmental programs to address natural resource, social, and economic concerns

A windbreak restoration project led by the Kansas Forest Service illustrates the critical role conservation districts can play in landscape-scale initiatives. Historically, windbreaks have been a valuable practice for Kansas land managers, but by 2013 many were in need of repair to improve their ability to protect soil from erosion, enhance crop productivity, and provide public health benefits. To understand the state of windbreaks across 14 counties, Kansas Forest Service partnered with conservation districts to develop a protocol using remote sensing data to assess windbreak condition and overlay parcel boundaries to identify landowners with windbreaks in need of renovation.

For those landowners interested in renovating their windbreaks, NRCS's Environmental Quality Incentives Program provides funding to offset the cost, but the support comes with deadlines and eligibility requirements, including working with a conservation district manager or district forester. Using the results from their landscape assessment, Kansas Forest Service worked with conservation districts to send personalized letters to landowners focused on key messaging about windbreak conservation benefits and cost-share opportunities (Dellorto-Blackwell 2018). This targeted approach resulted in high rates of windbreak renovation in the region, illustrating how landscape assessment can help focus limited resources on impactful projects and provide an opening for substantive land manager engagement.

University Cooperative Extension

Land grant universities are a major source of locally and regionally specific research, training, and outreach for conservation practice implementation in agricultural and other contexts.

- **Geographic focus:** County, regional, State
- **Key personnel:** Extension agents, business and farm management specialists
- **Core duties:** Education, technical assistance, demonstration sites, soil and water conservation, species selection, grazing systems, farm business planning
- **Economic tools:** Enterprise budgets, market analysis
- **Landscape-scale opportunities:** Research-based guidance for regional agroforestry adoption and scaling

Washington State University (WSU) Extension is working with partners to support bigleaf maple (*Acer macrophyllum*) sugaring across the Pacific Northwest as a way for farm and forest land managers to diversify their operations and income sources. Maple sugaring is far more common in the Eastern United States, but advances in sugaring technology have made tapping western North America's bigleaf maple—with its lower relative sugar content—more practical and commercially viable. Maples are ecologically valuable for the wildlife habitat they provide and for their ability to improve soil health and sequester carbon.

WSU Extension and partners see opportunities for maple sugaring on marginal land. For example, in riparian buffer zones where timber cultivation is impractical, sugaring can provide income and support conservation objectives (Roberts 2024). By improving access to locally made equipment, expanding market access, developing regionally specific best practices, and conducting trainings, WSU Extension and partners including Oregon State University and University of Washington have worked to reduce barriers to landscape-scale adoption of maple sugaring (Washington State University, n.d.).

Watershed associations/conservation nonprofits

Many conservation or agriculture-oriented nonprofits work at the watershed, community, or regional level to promote sustainable land management, protect farmland and open space, and achieve other conservation objectives. These organizations often work to convene, educate, manage projects with partners, and administer grants and other funding. Organizations can range from small, community-based associations composed of volunteers to larger organizations with significant funding and staff capacity. Often, these organizations are composed of local leaders with a range of backgrounds united over one or multiple specific, place-based missions. Because of their local expertise and community connections, these organizations are often valuable, credible partners in landscape planning efforts.

- **Geographic focus:** Local to regional
- **Key personnel:** Program and project coordinators, outreach specialists, volunteers
- **Core duties:** Convening, education and communication, data sharing, fundraising
- **Economic tools:** Grants
- **Landscape-scale opportunities:** Coordination of multiple projects on private land to improve water quality, wildlife habitat, and connectivity across watersheds

Local government

Local governments influence land use through zoning, ordinances, and incentive programs. They can play a critical role in supporting agroforestry adoption by integrating conservation goals into planning and development initiatives.

- **Geographic focus:** Local
- **Key personnel:** Planning and zoning officials; planning boards and commissions; agricultural, conservation, and open space committees
- **Core duties:** Land use planning, permitting, policymaking, community outreach
- **Economic tools:** Tax incentives, cost-share programs, municipal grants
- **Landscape-scale opportunities:** Incorporation of agroforestry into green infrastructure plans, urban forestry programs, and climate adaptation/resilience projects

Pennsylvania's [Countywide Action Plans \(CAPs\)](#) illustrate how locally led partnerships can be organized to address landscape-level problems and how agroforestry may fit in as part of larger landscape planning efforts involving other conservation practices. CAPs are collaborative frameworks that bring together county governments, conservation districts, municipalities, State agencies, nonprofits, and landowners to reduce nutrient and sediment pollution to meet Pennsylvania's legally mandated reductions under the Chesapeake Bay Total Maximum Daily Load cleanup plan. Of the State's 43 counties that drain into the Chesapeake Bay, 34 have developed CAPs.

CAPs are funded primarily through Pennsylvania State grants (Chesapeake Bay CAP Implementation Block Grant) and Federal Chesapeake Bay Program funds. The Pennsylvania Department of Environmental Protection supports them with technical assistance, data, and dedicated CAP coordinators. Through CAPs, partners collaborate at the county level to integrate site-level practices, such as riparian forest buffers, streambank stabilization, and other conservation practices into a unified strategy to meet regional water quality targets. CAPs support communication between State and local stakeholders and between counties, and they connect municipalities, land managers, and partner organizations to verify progress and replicate successful approaches.

In one example, the Northumberland County Conservation District worked with two landowners to plant 15 acres of riparian buffers along an impaired stream in 2024. The planting, funded by a CAP Block Grant, caught the attention of neighboring landowners who committed to plant 4 additional acres (Pennsylvania Department of Environmental Protection 2025). This locally led approach complements other collaborative planning processes, such as NRCS areawide planning, by aligning site-specific practices with regional goals.

Conclusion

Agroforestry can be an important component of plans to address environmental problems that reach beyond the farm or ranch. A landscape perspective can help natural resource professionals properly locate and design agroforestry practices to address these problems. The unique, multifunctional nature of agroforestry makes it especially appealing and adaptable to a range of landscape-scale ecological, economic, social, and cultural objectives. It can also open the door to options across land uses to connect private and public land.

Additional Information

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