Chapter 1: Defining Agroforestry

Agroforestry: Definition and Practices

What is agroforestry?
Agroforestry is a new word for an ancient set of practices. Agroforestry presents opportunities for new market ventures; sustainable climate-smart agriculture; land stewardship; habitat for wildlife; improved air and water quality; diversified farm income; and increased wealth for rural communities.

Simply, agroforestry is intentionally-designed land-use management combining trees and/or shrubs with crops and/or livestock.

Agroforestry practices are designed to fit specific niches that meet specific farm or community objectives. Agroforestry practices help farmers to diversify products, markets, and farm income; improve soil and water quality; and reduce erosion, non-point source pollution and damage due to flooding. The integrated practices of agroforestry enhance land and aquatic habitats for fish and wildlife and improve biodiversity while sustaining land resources for generations to come. In a changing climate, agroforestry practices can be designed and strategically located to provide greater resiliency in agricultural landscapes so farmers can meet production objectives when faced with extreme weather (e.g., drought, floods). Tree-based practices sequester significant amounts of carbon that can help meet future potential greenhouse gas reduction goals.

Definition of Temperate Agroforestry
Intensive land-use management that optimizes the benefits (physical, biological, ecological, economic, social) from biophysical interactions created when trees and/or shrubs are deliberately combined with crops and/or livestock.

Agroforestry Key Criteria
Four key criteria characterize agroforestry
Practices. Application of the 4 “I” criteria are key to determine what is, and what is not, an agroforestry practice.

Intentional
Combinations of trees, crops, and/or livestock are intentionally designed, established, and/or managed to work together and yield multiple products and benefits, rather than as individual elements which may occur together but are managed separately. Agroforestry is neither monoculture farming, nor is it a mixture of monocultures.

Intensive
Agroforestry practices are created and intensively managed to maintain their productive and protective functions, and often involve cultural operations such as cultivation, fertilization, irrigation, pruning and thinning.

Integrated
Components are structurally and functionally combined into a single, integrated management unit tailored to meet the objectives of the landowner. Integration may be horizontal or vertical, above- or below-ground, simultaneous or sequential.

Working with UMCA staff and natural resources professionals helps landowners plan and implement agroforestry practices.
Integration of multiple crops utilizes more of the productive capacity of the land and helps to balance economic production with resource conservation.

**Interactive**

Agroforestry actively manipulates and utilizes the interactions among components to yield multiple harvestable products, while concurrently providing numerous conservation and ecological benefits.

Specialty mushrooms can be grown on logs in a forest farming practice for additional income, as explained by Nicola MacPherson of Ozark Forest Mushrooms at this field day.

The six recognized agroforestry practices

- Riparian and Upland Forest Buffers
- Windbreaks
- Alley Cropping
- Silvopasture
- Forest Farming
- Urban Food Forests

1. **Riparian and Upland Forest Buffers**

Riparian forest buffers are strips of permanent vegetation, consisting of trees, shrubs, and grasses, planted or managed between agricultural land (usually cropland or pastureland) and water bodies (rivers, streams, creeks, lakes, wetlands) to reduce runoff and non-point source pollution. Forest buffers are usually planted in three distinct zones near an agricultural stream for stabilizing streambanks, improving aquatic and terrestrial habitats, and providing harvestable products. Upland buffers with cool- or warm-season grass alone or combined with shrubs and/or trees are also used to reduce nonpoint-source pollution and prevent gully formation in agricultural watersheds.

2. **Windbreaks**

Windbreak practices (and variations, e.g., shelterbelts, timberbelts, hedgerows, and living snowfences) are planted and managed as part of a crop or livestock operation to enhance crop production, protect crops and livestock, manage snow distribution, and/or control soil erosion.

Field windbreaks are used to protect a variety of wind-sensitive row crops, forage, tree, and vine crops to control soil erosion, and to provide other benefits such as improved insect pollination of crops and enhanced wildlife habitat.

Livestock windbreaks help reduce animal stress and mortality, improve feed and water consumption, enhance weight gain and calving success rates, and control odor. Timberbelts are managed windbreaks also designed to increase the value of the forestry component.
3. Alley Cropping
This practice combines trees planted in single or multiple rows with agricultural or horticultural crops cultivated in the wide alleys between the tree rows. High-value hardwoods such as oak, walnut, ash, and pecan are favored species in alley cropping practices, and can potentially provide high-value lumber or veneer logs in the long-term.

Crops or forages grown in the alleys, and nuts from walnut, pecan and chestnut trees, provide annual income from the land while the longer-term wood crop matures. Specialty crops (herbs, fruits, vegetables, nursery stock, flowers, etc.) can be grown in alleys, utilizing the microclimate created by trees to boost economic production from each acre.

4. Silvopasture
This practice combines trees with forage (pasture or hay) and livestock production.

Silvopasture can be established by adding trees to existing pasture, or by thinning an existing forest stand and adding (or improving) a forage component. Trees are managed for high-value timber or sawlogs, and at the same time they provide shelter for livestock, reduce heat stress and improve food and water consumption. In the winter, the protection of trees reduces cold stress — therefore, animals do not lose as much energy keeping warm and are able to gain more weight.

Forage and livestock provide short-term income at the same time a crop of high-value sawlogs is being grown, providing a greater overall economic return from the land.

5. Forest Farming
In forest farming practices, high-value specialty crops are cultivated under the protection of a forest overstory that has been modified and managed for sustained timber production or other forest objectives and to provide the appropriate microclimate conditions.

Shade-tolerant specialty crops like ginseng, shiitake mushrooms, and decorative ferns grown in the understory are sold for medicinal-botanical, decorative/handicraft, or food products. Overstory trees can be managed to produce timber and veneer logs, or for other multifunctional purposes.

A key concern in developing agroforestry nomenclature for the U.S. is overlap and confusion with mainstream land use management disciplines,
e.g., forestry, agriculture, and livestock production. There is a fundamental need to develop a definition and criteria that would effectively distinguish practices that are agroforestry from those that are not. Application of the four criteria defining agroforestry (intentional, intensive, integrative, and interactive) provide the key to determine what is and is not an agroforestry practice.

**Perspectives**

**Agroforestry and farmer adoption in the U.S.**

Although there is currently no national database or inventory, farmer adoption and application of agroforestry practices, while small, is beginning to accelerate. A significant focus on access and equity in the expansion of agroforestry in the U.S. will require increased attention on the four “P”s of adoption:

- **Peer-to-peer learning**
- **Professionals**
- **Partnerships**
- **Programs**

**Specifically, it will require more:**

**Peer-to-peer learning:**
- Identifying diverse respected farmers who have adopted and practice agroforestry.
- Connecting them with other producers who are not currently practicing agroforestry.
- Knowledge of local customs/culture and employing methods/tools such as:
  - *Inclusive farmer meets farmer spaces*
  - *On-farm demonstration sites, workshops*
  - *Social media/networks*

**Professionals:**
- An increased number and diversity of professionals with agroforestry expertise are essential to pro- vide the technical, educational, marketing assistance requested by producers.
- Advancing agroforestry literacy through:
  - Regional/state agroforestry training programs (e.g., UMCA Annual Agroforestry Academy)
  - Agroforestry degrees and certificates offered by universities (e.g., online MS and Graduate Certificate offered by the University of Missouri Center for Agroforestry)
  - Certification of agroforestry professionals (e.g., joint national “certified agroforester” program sponsored by professional forestry/natural resource/agricultural societies – under discussion).

**Partnerships:**
- Bringing people together to increase awareness and understanding of agroforestry, producer objectives, community, and watershed goals.
- Multi-state/regional partnerships may be most effective. Examples include:
  - Northeast and Mid-Atlantic Agroforestry (NEMA). [https://www.capitalrcd.org/nemaagroforestry.html](https://www.capitalrcd.org/nemaagroforestry.html)
  - Mid-American Agroforestry Working Group (MAAWG). [Midamericanagroforestry.net](https://midamericanagroforestry.net)
- Lasting partnerships need a clear purpose and tangible project(s) to keep members engaged. For example, NEMA and MAAWG sponsor networking and educational activities to advance regional agroforestry interests. For example, MAAWG helped to establish Annual Agroforestry Academy.
- Establishing agroforestry communities of practices Cg., the eXtension Forest Farming community of practice created by a team led by Virginia Tech with USDA support.

**Programs:**
- USDA and other state/local programs provide vital resources that make it possible for professionals to provide the assistance that supports planning and establishment of agroforestry practices.
- USDA assistance helps advance agroforestry adoption and practice application includes:
Programs cont’d:

- The Natural Resource Conservation Service’s (NRCS) Environmental Quality Incentives Program (EQIP) provides agricultural producers with financial resources and one-on-one help to plan and implement conservation practices;
- The Sustainable Agriculture Research and Education (SARE) offers grants to farmers, ranchers and agricultural professionals for on-farm research, education, and professional and community development;
- The National Institute of Food and Agriculture’s Renewable Resources Extension Act and McIntire-Stennis Cooperative Forestry Research programs;
- The U.S. Forest Service’s Forest Stewardship and Research & Development programs.
- The 2012 Census of Agriculture (USDA National Agricultural Statistics Service) includes the first-ever agroforestry practice question. Simply asking the right question might get a producer/landowner thinking about adopting agroforestry!

Non-profit organizations such as the Savanna Institute, Interlace Commons, and the Appalachian Beginning Forest Farmers Coalition serve to collect, curate, and convene for agroforestry implementation and knowledge exchange.

Farmer-led Cooperatives connect both established and emergent specialty crops producers to support a wide variety of services including support with processing, marketing, distribution, and consumer awareness.

The private sector, including farmland trusts and finance companies, create financial opportunities and incentives for capital needs in agroforestry.
Additional Resources

**Agroforestry Organizations, Groups, and Centers:**

University of Missouri Center for Agroforestry (UMCA)  
**Link:** http://www.centerforagroforestry.org

Association for Temperate Agroforestry  
**Link:** www.aftaweb.org/

Cornell Agroforestry  
**Link:** http://smallfarms.cornell.edu/projects/agroforestry/

Extension Forest Farming Community of Practice  
**Link:** https://forest-farming.extension.org/

Green Lands/Blue Waters  
**Link:** http://greenlandsbluewaters.net/

Midwest Perennial Forage Working Group (MPFWG)  
**Link:** http://greenlandsbluewaters.net/Perennial_Forage/

Perennial Biomass Working Group

Perennial Grains Working Group

Midwest Cover Crops Council  
**Link:** www.mccc.msu.edu/

NEMA – Northeast/Mid-Atlantic Agroforestry  
**Link:** https://www.capitalrcd.org/nemaagroforestry.html

Savanna Institute  
**Link:** www.Savannainstitute.org

University of Minnesota Center for Integrated Natural Resources and Agricultural Management  
**Link:** https://www.cinram.umn.edu/

USDA National Agroforestry Center  
**Link:** https://www.fs.usda.gov/nac/

Virginia Tech Agroforestry  
**Link:** https://agroforestry.frec.vt.edu/

**Agroforestry Publications**

USDA Agroforestry Fact Sheet  
**Link:** https://www.usda.gov/sites/default/files/documents FactSheet_final_8-1-11.pdf

Working Trees  
**Link:** https://www.fs.usda.gov/nac/resources/publications/index.php

Inside Agroforestry  
**Link:** https://www.fs.usda.gov/nac/resources/publications/index.php

Agroforestry Notes  
**Link:** https://www.fs.usda.gov/nac/resources/publications/index.php
In print


Notes