# Chapter 1: Defining Agroforestry

**Agroforestry:**
**Definition and Practices**

**What is agroforestry?**
*Agroforestry is new market opportunities. Sustainable "climate-smart" agriculture. Land stewardship. Habitat for wildlife. Improved air and water quality. Diversified farm income. Increased wealth for rural communities.*

In simple terms, agroforestry is intensive land-use management combining trees and/or shrubs with crops and/or livestock.

Agroforestry practices are designed to fit specific niches within the farm to meet specific landowner objectives.

Agroforestry practices help landowners 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 landowners 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 (USA):**
*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, simultane-

Working with UMCA staff and natural resources professionals helps landowners plan and implement agroforestry practices.

ous or sequential. 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 five recognized agroforestry practices

- **Riparian and Upland Forest Buffers**
- **Windbreaks**
- **Alley Cropping**
- **Silvopasture**
- **Forest Farming**

### *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 (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 designed to increase the value of the forestry component.

*Forest Farming* *Silvopasture* *Alley Cropping* *Riparian Forest Buffers* *Windbreaks*

**Definition and Practices**

*Is it agroforestry?*
*Application of the 4 "I"'s*

**The four key criteria revisited**

*Application of the 4 "I" criteria are key to determine what is and what is not an AF practice:*

- *Intentional*
- *Intensive*
- *Integrated*
- *Interactive*

**Characteristics of Agroforestry Practices**

*Land-use practices deliberately integrated into the whole farm*

*Contain complex interactions among components suited to particular environments and human needs*

*Competition and its management is critical*

*Has two or more outputs*

*The "cycle" of an agroforestry practice is always more than one year*

*Even the simplest agroforestry practice is more complex, ecologically (in terms of structure and function) and economically than monocropping*

*For the landowner, often judged successful or not by the bottom line "does it pay?"*

### *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 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 are managed to produce timber and veneer logs.

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 on U.S. agroforestry and landowner adoption

Although there is currently no national database or inventory, landowner adoption and application of agroforestry practices is believed to be very low. A significant expansion of agroforestry in the U.S. will require an increased focus on the four "P"s of adoption:

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

**Specifically, it will require *more*:**

Peer-to-peer learning:

- Identifying respected landowners/producers that have adopted and practice agroforestry.
- Getting them connected with other producers who are not currently practicing agroforestry.
- Knowledge of local customs/culture and employing methods/tools such as:
  - *Farmer meets farmer in the "back forty"*
  - *On-farm demonstration sites, workshops*
  - *Social media/networks*

Professionals:

- An increased number of professionals with agroforestry expertise are essential to provide the technical, educational, marketing assistance requested by landowners.
- Advancing agroforestry literacy through:
  - o Regional/state agroforestry academies
  - o Agroforestry majors/certificates offered by universities (e.g., online Master's Degree and Graduate Certificate in Agroforestry offered by the University of Missouri).
  - o Certification of agroforestry professionals (e.g., joint national "certified agroforester" program sponsored by professional forestry/natural resource/agricultural societies).

Partnerships:

- Bringing people together to increase awareness and understanding of agroforestry, landowner objectives, community, and watershed goals.
- Multi-state/regional partnerships may be most effective. Examples include the 1890 Agroforestry Consortium (1890 AFC), Chesapeake Bay Agroforestry Team (CBAT), and the Mid-American Agroforestry Working Group (MAAWG)
- Lasting partnerships need a clear purpose and tangible project(s) to keep members engaged. For example, The 1890 AFC brings together the 20 1890 land-grant universities and USDA agency partners to advance agroforestry research, teaching and extension. CBAT is focusing on implementing the actions in Section 4 - Agroforestry of the Chesapeake Bay Forest Restoration Strategy. The MAAWG sponsors networking and educational activities to advance regional agroforestry interests. As a tangible project, The MAAWG is helping to facilitate the weeklong Agroforestry Academy.
- Establishing agroforestry communities of practices such as the Forest Farming community that has been established 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 that helps advance agroforestry adoption and practice application includes: the Natural Resource Conservation Service's Environmental Quality Incentives and Conservation Stewardship programs; the National Institute of Food and Agriculture's Renewable Resources Extension Act and McIntire-Stennis Cooperative Forestry Research programs; and 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!

## Additional Resources

***In Print:***

- Garrett, H.E., (ed.) 2009. North American Agroforestry: An Integrated Science and Practice. 2nd. ed. Madison, WI. American Society of Agronomy, Inc..
- Gordon, A.M. and S.M. Newman. 1997. Temperate Agroforestry Systems. CAB International, 269 p.
- Jose, S., M.A. Gold and H.E. Garrett. 2012. The Future of Temperate Agroforestry in the United States. In: Garrity, D.P. and P.K.R. Nair (eds). Agroforestry – The Way Forward. Advances in Agroforestry Book Series, Springer Science.
- Josiah, Scott J. 2000. Discovering Profits in Unlikely Places: Agroforestry Opportunities for Added Income. University of Minnesota Extension. WW-07407 2000.
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***Online:***

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- Beetz, A. 2011. Agroforestry: An Overview. National Sustainable Agriculture Information Service, National Center for Appropriate Technology (ATTRA) IP155. http://www.agmrc.org/media/cms/agrofor_A18CE08578D41.pdf
- Brant, G. 2011. +H: The Human Considerations in the Adoption of Agroforestry. Agroforestry Note 43. USDA National Agroforestry Center, Lincoln, NE. http://nac.unl.edu/documents/agroforestrynotes/an43g13.pdf
- Chesapeake Bay Forest Restoration Strategy, including Section 4 – Agroforestry: http://executiveorder.chesapeakebay.net/chesapeakeforestrestorationstrategy.pdf
- 1890 Agroforestry Consortium: http://www.csrees.usda.gov/nea/nre/in_focus/forests_if_1890agro.html
- eXtension Forest Farming Community of Practice: http://www.extension.org/pages/62959/forest-farming-community
- Green Lands/Blue Waters: http://www.leopold.iastate.edu/green-lands-blue-waters
- Center for Integrated Natural Resources and Agricultural Management: http://www.cinram.umn.edu/
- Iowa State University Riparian Management Systems: http://www.buffer.forestry.iastate.edu/
- Mid-American Agroforestry Working Group: http://midamericanagroforestry.net/
- Midwest Cover Crops Council: http://www.mccc.msu.edu/
- The Center for Agroforestry, University of Missouri. http://www.centerforagroforestry.org/
- The Center for Subtropical Agroforestry, University of Florida. http://sfrc.ifas.ufl.edu/cstaf/
- USDA National Agroforestry Center: http://www.unl.edu/nac/
- U.S. Department of Agriculture, 2011. USDA Agroforestry Strategic Framework, FY 2011-2016. Washington, DC. 35 p. http://www.usda.gov/documents/AFStratFrame_FINAL-lr_6-3-11.pdf.
- U.S. Department of Agriculture, Office of Secretary. 2013. USDA policy for agroforestry. Departmental Regulation 1073-002. http://www.ocio.usda.gov/document/departmental-regulation-1073-002
- World Agroforestry Centre: http://www.worldagroforestry.org/

# Notes