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## **PB1574 Managed Forests for Healthy Ecosystems**

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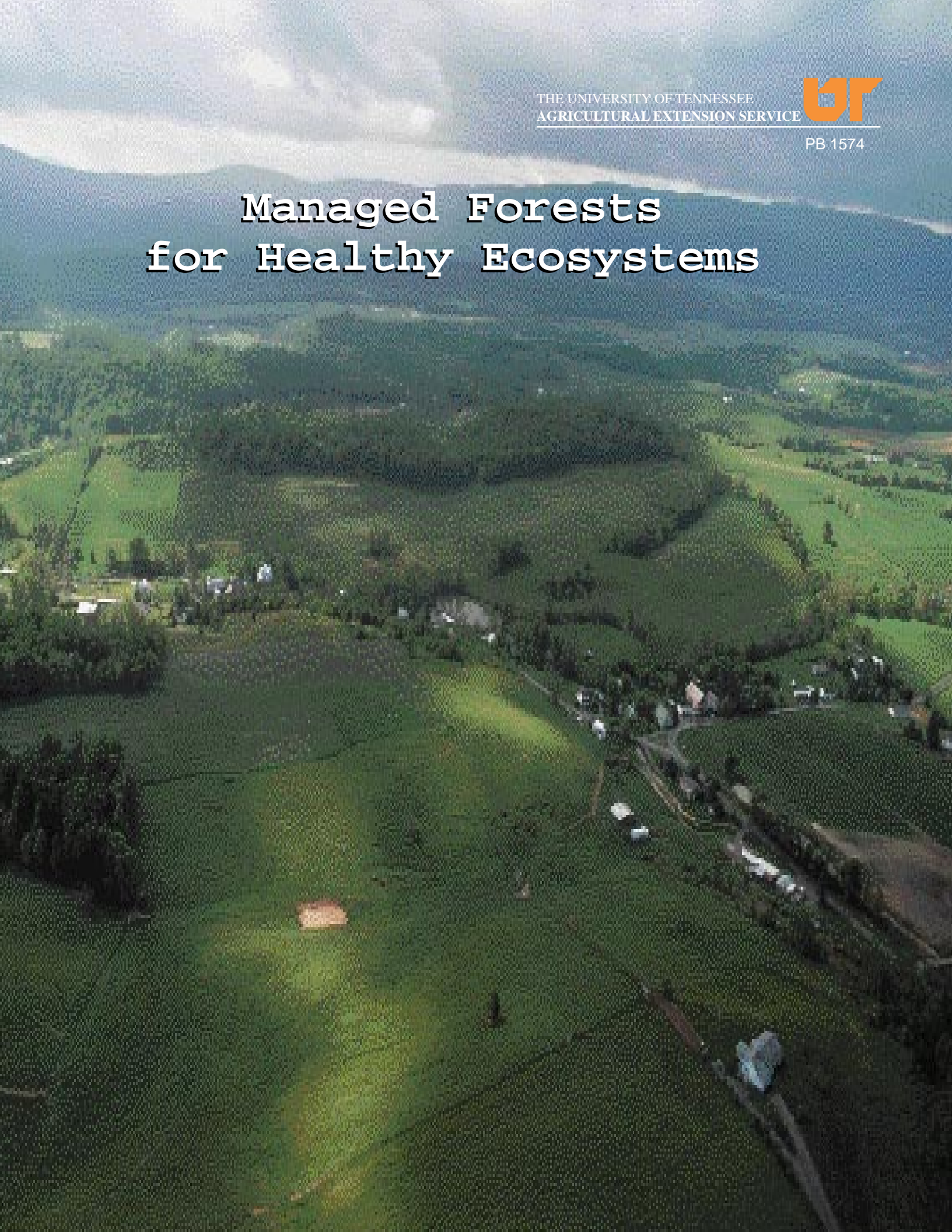
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# Managed Forests for Healthy Ecosystems



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# Managed Forests for Healthy Ecosystems

## Introduction

The forests of the southern United States have played a colorful and historic role in the region's growth and development. Early settlers relied on the forest for fuel and pasture. Hand- and water-powered sawmills produced rough pine lumber for home building, and turpentine and rosin became important export products for the navies of the world. Oak barrels and casks were manufactured for a growing agricultural industry. Nuts and fruits from many tree species provided important food sources for both pioneers and wildlife.



During the 1800s and early 1900s, about half of the acreage in the South was in some form of agricultural production, with cotton and tobacco as major crops. The spread of the boll weevil, the Great Depression, severe erosion caused by abusive farming and severe droughts caused many family farms to fail in the 1920s and 1930s, and forests began to reclaim abandoned fields over much of the South.

*tree planting*





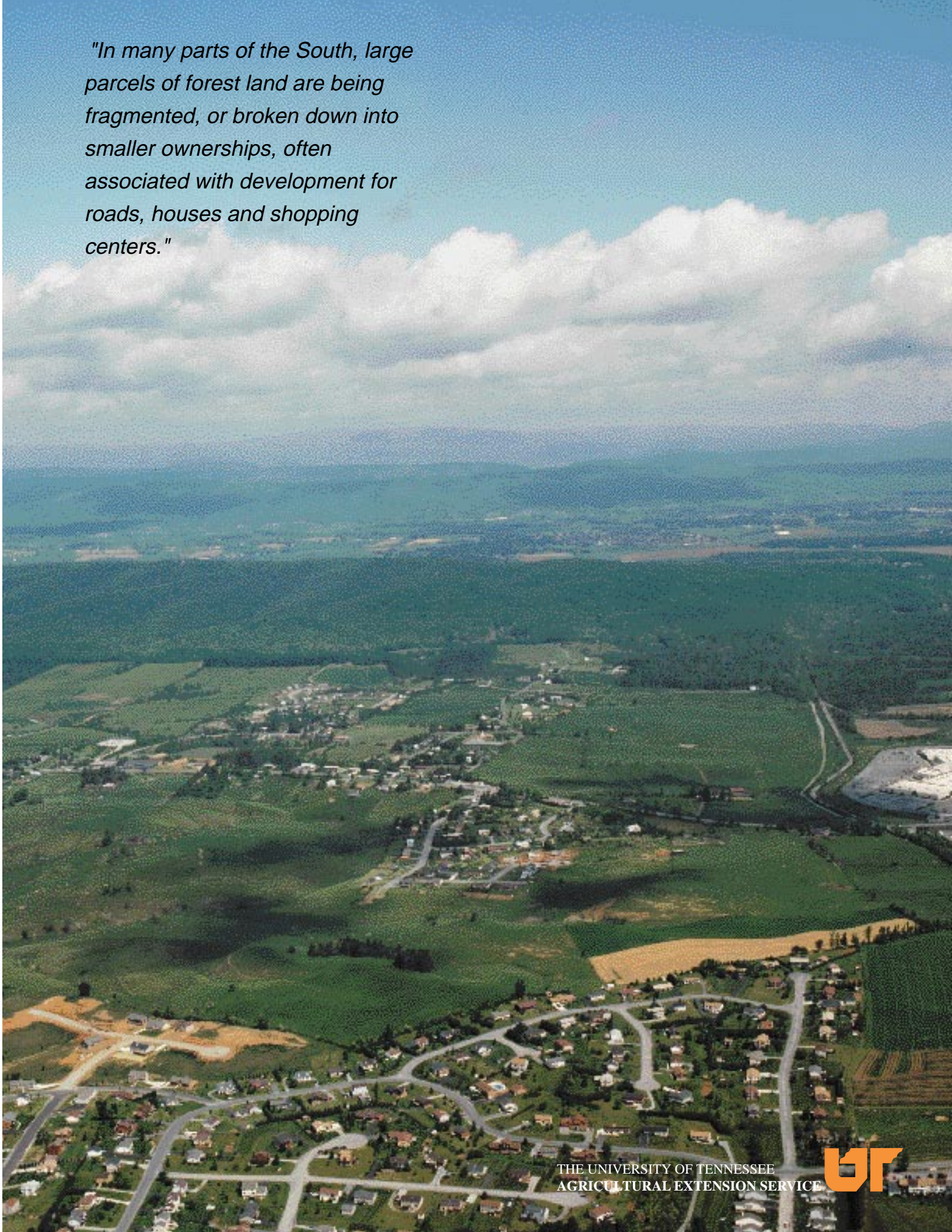
During the 1920s and 1930s, southern forestry really got its start. Early efforts at wildfire protection and reforestation succeeded, and a large and diverse forest products industry developed to utilize the vast timber supplies that were now growing throughout the region. Through the combined efforts of state and federal forestry agencies, private timber companies, Cooperative Extension Services and land-grant universities, the knowledge of how to grow, manage and utilize southern tree species was acquired and implemented.

Over time, the concept of **multiple-use and sustained-yield** management evolved. This simply means that forests should be managed to provide multiple benefits, and these benefits should never be entirely depleted. For example, common multiple benefits might include timber for a variety of wood products, food and **cover** for wildlife, and clean water. The 50-year success of southern forestry indicates to us that this model has worked rather well. However, there are some troubling signs on the horizon. In many parts of the South, large parcels of forest land are being **fragmented**, or broken down into smaller

*pine plantation*



*"In many parts of the South, large parcels of forest land are being fragmented, or broken down into smaller ownerships, often associated with development for roads, houses and shopping centers."*





ownerships, often associated with development for roads, houses and shopping centers. Water quality continues to be a concern, and although streams flowing through properly managed forests are generally clean, those flowing through farmland and urban areas often are not. Re-establishing forest corridors along streams is part of the solution to water quality problems. Populations of certain species of wildlife are declining, most notably migratory songbirds; while other species, such as deer, are increasing. At the same time, exotic pest populations are increasing. Zebra mussels are invading our streams and lakes, and the gypsy moth is slowly, but steadily, expanding its range southward. These problems affect our southern forests in a variety of ways. Through proper resource management, we can address them in new and innovative ways. We can and should rely on knowledge gained from past successes and lessons from mistakes to take advantage of new technology as we aggressively attack the problems of today.

During the past several years, a new concept, **ecosystem management**, has emerged. Its roots are found in the Pacific Northwest, where conflicts over timber harvesting, forest health and wildlife habitat requirements challenged land managers to find new solutions to their problems. Ecosystem management is an attempt to preserve the health and productivity of large blocks of land, simultaneously providing necessary products like timber, while maintaining clean water, diversity of

plant and animal species, and recreational values. In addition to simply managing resources, people's needs and activities are also important aspects of ecosystem management.

In this publication, we will more completely describe the concept of ecosystem management, and provide examples of how it may apply to your woodland. The older multiple-use and sustained-yield principles will not be forgotten; they will simply become part of a larger goal of maintaining healthy ecosystems. Responsible forestry and agricultural practices that are consistent with this goal will not be affected.

**"Ecosystem management is an attempt to preserve the health and productivity of large blocks of land, simultaneously providing necessary products like timber, while maintaining clean water, diversity of plant and animal species, and recreational values."**





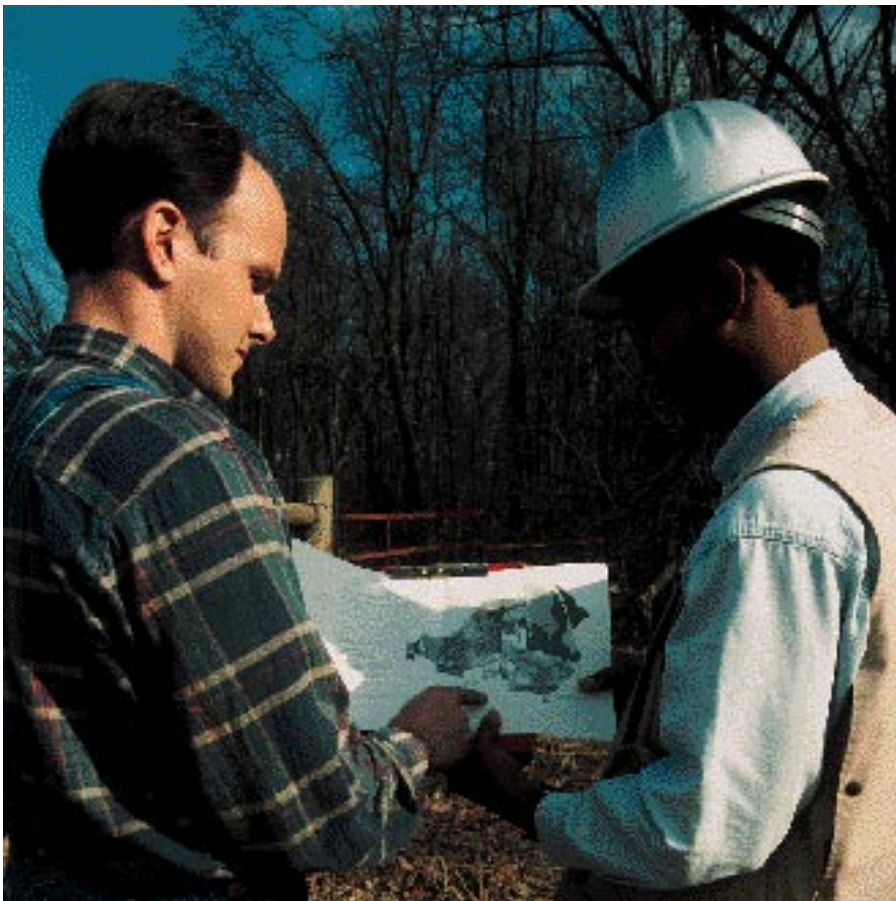




## II. Evolving Levels of Land Management

The practice of forestry in the United States has evolved considerably since its beginnings in the early 1900s. Early foresters were concerned primarily with fire control and reforesting cutover and burned lands. Gradually, the practice of forestry grew into more intensive land management, with multiple objectives, such as wood production, improvement of fish and wildlife habitats and populations, protection of soil and water resources and natural beauty, and the maintenance of healthy and functioning ecosystems. The degree to which land managers are successful in meeting these objectives depends in part upon what we call the “scale of management.” There is no right or wrong scale of management, but obviously some objectives are better met if they are targeted toward a particular scale. The assistance of professional resource managers such as foresters and wildlife biologists is invaluable in developing a management plan that is right for you and your land.

*"The assistance of professional resource managers such as foresters and wildlife biologists is invaluable in developing a management plan that is right for you and your land."*





### **A. Stand Scale: Managing Individual Stands or Woodlots**

Foresters frequently think about a forest as a collection of individual **stands** of trees. A stand is simply an area where the species and age of trees are similar enough so it is distinct from other areas around it. Stands can be created naturally; such as the regeneration of pines in a burned area or sweetgum invading an abandoned field. Sometimes foresters create stands through timber harvesting and replanting, or allowing trees to regenerate by stump sprouts and natural seedlings. Stands can vary greatly in size, from one to hundreds of acres. Many farm woodlots are isolated stands, surrounded by fields or pastures.



In some cases, foresters manage stands as individual areas of a single species, separate from the surrounding land. We consider this the "stand scale". This scale of management is appropriate only for the most simplistic of objectives, for example, a 20 acre loblolly pine plantation where the sole objective is to produce timber for sale. If multiple objectives are desired, for example, if managing wildlife populations is also a consideration, a higher scale of management will be necessary.



## B. Property Scale: Managing the Total Property

Most landowners do not own a single stand of trees. In fact, a total property frequently consists of numerous stands of trees, often with active or abandoned fields. Some properties have streams or ponds, and maybe even a house and yard. We think of the “property scale” as the management of the total property, including all of the natural resources associated with the property. Suppose a landowner is interested in improving the habitat for upland game birds and songbirds, while also producing some timber for sale. It is obvious that when

complicated need to have a management. It is consider the requirements of the interest, as well as and economic

*"when you add more complicated objectives, you need to have a higher scale of management."*

you add more objectives, you higher scale of important to habitat wildlife species of the growth, quality potential of the

timber. Often some tradeoffs are necessary. For example, on small ownerships, it may not be possible to meet all timber and wildlife objectives. There may simply not be enough area.

If your home is your castle, then your land is your domain. This domain stops at the boundary line with the adjacent property. Within the boundary lines you are free to cut trees, plant trees, improve habitat or burn fields, all to meet your objectives. But all this activity must stop at the property line. Nature, however, shows little respect for property lines. Wildlife moves freely across property lines, as do southern pine beetles, gypsy moths and the spores of fusiform rust disease. Unless there is a **fuel break** along the property line, wildfire likewise shows a disrespect for property boundaries. Your property sits somewhere in a **watershed**, which means that someone else is downstream and can be affected by what you do on your land, and you can be affected by the activities of those above you.

It is clear to see that, for some management objectives, even total property management will not be sufficient. However, even if you cannot control the use of adjacent land, you can certainly take into account the adjacent land uses when managing your own land.

*"Nature, however, shows little respect for property lines. Wildlife moves freely across property lines, as do southern pine beetles, gypsy moths and the spores of fusiform rust disease."*







### ***C. Neighborhood Scale: Managing the Total Property as Part of a Neighborhood***

We all have neighbors. Perhaps you get along better with some neighbors than others. When managing natural resources, it becomes very important to consider how your neighbors manage their land, because they may certainly affect your land and your own management objectives. If you have good, cooperative relationships with your neighbors, it is much easier to gain access to their land to observe their resources and management. Otherwise, you must rely on what you can see from the property line or observe from aerial photographs. The “neighborhood scale” includes the management of the total property, but with the additional input of adjacent land uses and practices. To manage at this scale, you must have knowledge of and respond to the activities of your neighbors.

A simple example may help. Suppose you are interested in managing for wild turkeys. Turkeys range over broad areas and require certain critical habitat elements such as water, mature forests for food and cover, nesting areas and open grassy fields where young poults can catch the protein-rich insects needed during their first six weeks of life. You can determine which of these elements are in shortest supply in your “neighborhood” by observing the adjacent lands, and focusing your efforts on providing the missing or depleted elements. It is unlikely that the turkeys will reside wholly on your property, unless you own a large acreage. But, by considering your property as part of a larger whole, you can certainly be more effective at meeting your objective.



*"it becomes very important to consider how your neighbors manage their land"*



*aerial photograph*





### *timber sale*

To be most effective at neighborhood scale management, you will need some cooperation with your neighbors. There are already many examples where adjacent landowners are cooperatively managing their lands to achieve objectives that wouldn't be possible otherwise. The pooling of smaller ownerships to create a larger area suitable for a hunting lease is a good example. Managing the larger tract for optimum wildlife habitat will produce higher populations of the desired species. Many landowners have also learned the financial benefit of joining their lands for a combined timber sale, resulting in greater profits. Joint road building, tree planting, pest management, burning and fire control, waste management and water quality improvements are other areas where neighbor cooperation can result in positive effects on the environment and in your pocket. Some landowners have formed clubs or cooperatives simply to create larger blocks of land for security, or to achieve joint management objectives.



*tree planting*

### *prescribed burning*



***"To be most effective at neighborhood scale management, you will need some cooperation with your neighbors."***





## ***D. Ecosystem Scale: Managing the Total Property as Part of an Ecosystem***

If you think about managing your land in its entirety, and consider the land uses adjacent to your property, you will soon realize that what others do on their land impacts what you can achieve on yours, and vice versa. If you carry this a step farther, you can imagine the land uses on your neighbor's neighbor's land, and so on. Before long, you're thinking about a fairly large piece of ground. How big a piece do you need to be concerned with? How many neighbors do you need to think about? We can't answer that question very easily, because it all depends. What is important is that both you and your neighbors are comfortable with any agreements you make, and you are mutually satisfied that your management objectives will be met.

If you're truly interested in ecosystem management, the best place to start is at home. Remember, the intent of ecosystem management is to preserve the health and productivity of the land, while providing for the benefits you want,

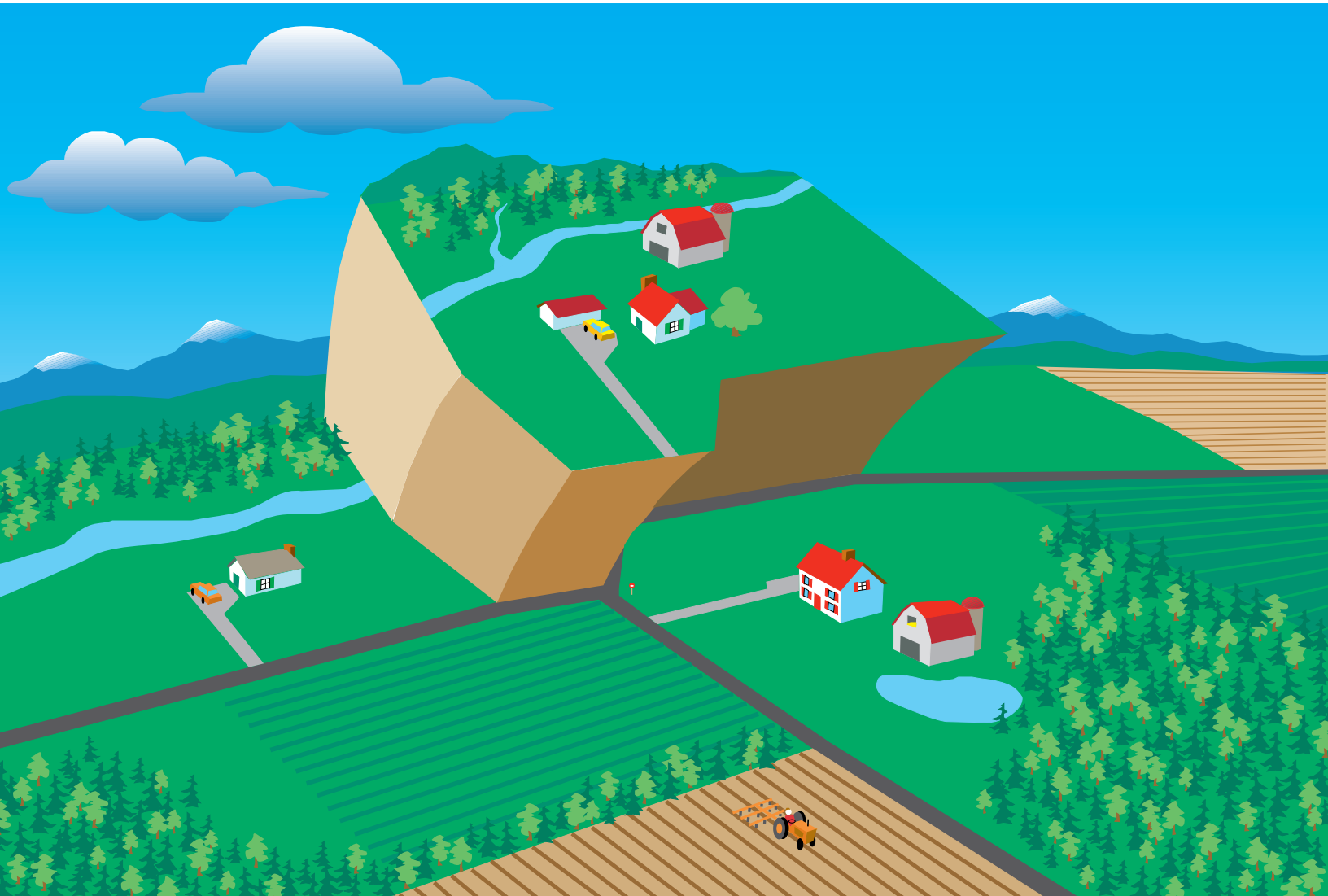
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*"what others do on their land impacts what you can achieve on yours, and vice versa."*

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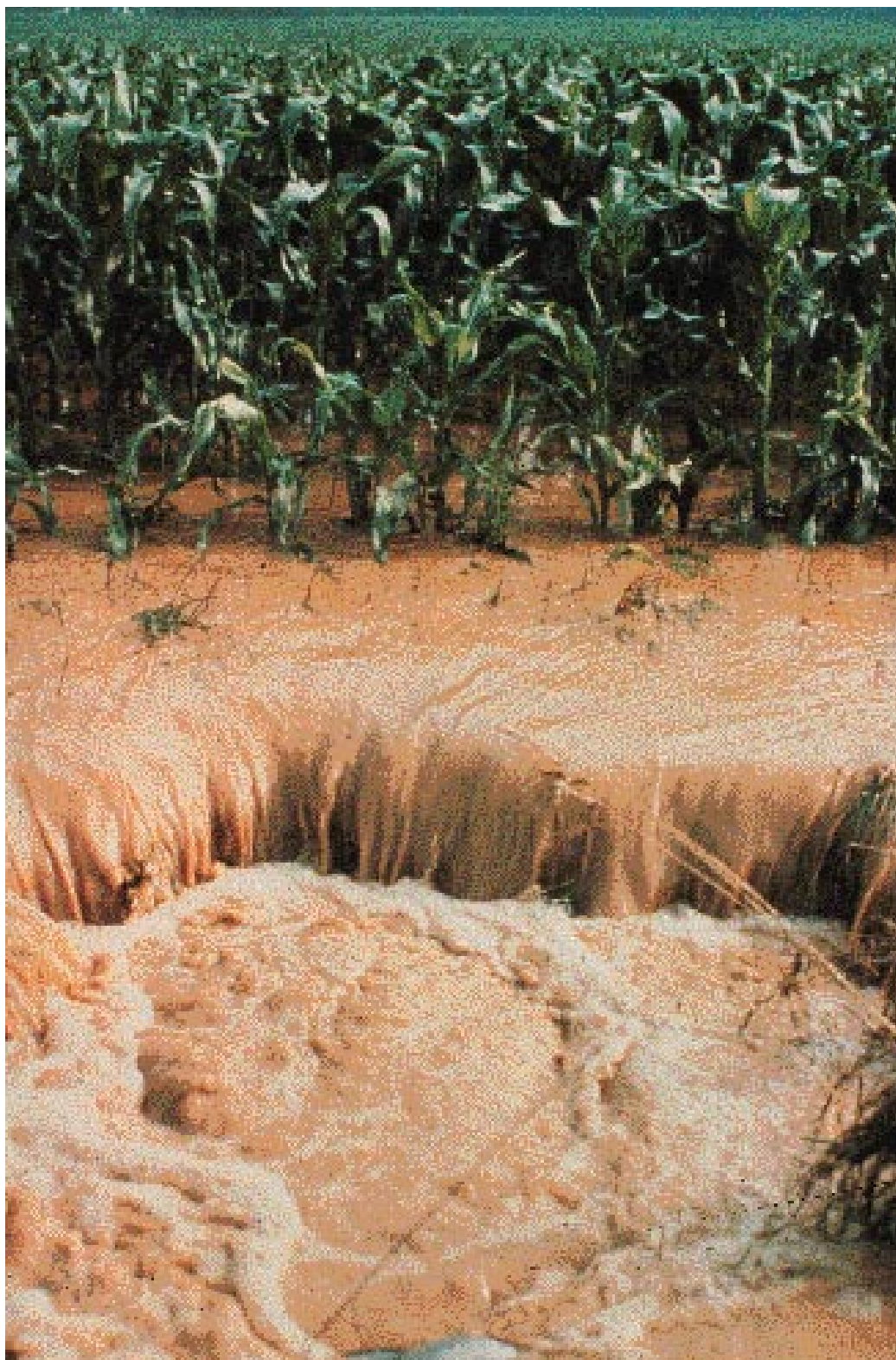




like timber, clean water and songbirds. You should make sure that, on your own land, you do not have any trouble spots. Are your trees healthy? Do you have a problem with invasive, exotic weeds such as honeysuckle, multiflora rose or kudzu? If you farm, do you have an adequate animal waste management system? Is water flowing off your property as clean as when it entered? This list can go on and on. The point is, proper land stewardship begins at home. Take a good look at your own practices and fix any problems.

Next, you should carefully consider all your land management objectives. Talk to experts available to help you. County Extension agents, county foresters, wildlife biologists, consultants, forest industry landowner assistance foresters and others all have educational materials for your use. They can also help you refine your objectives and determine what is possible. Based on your objectives, decide if the ecosystem scale is appropriate for you. If so, get an aerial photograph from your nearest Consolidated Farm Service Agency office. Look at adjacent land

*"proper  
land  
stewardship  
begins at  
home."*







uses on the photo, and scout around on public roads. Talk to your neighbors, and their neighbors. Perhaps they share your objectives. Even if you are not able to influence the management of lands around you, at least consider those land uses, which will put you at the neighborhood scale. If you are able to get your neighbors to join with you, consider joint projects where you can share equipment or supplies. Prescribed burns, pest management activities, timber sales and tree planting are all examples of projects that can pass across property lines.

Once you have started managing your land as part of a larger ecosystem, you may wish to modify your original objectives. You may

discover that other, broader objectives may be more feasible. For example, suppose you have a stream that flows through a couple of hundred yards of your land. But your neighbors, with whom you are now jointly managing, have two miles of the same stream. You may be very concerned about the quality of water in that entire length of stream, not just the little stretch on your land. In a nutshell, that is what ecosystem management is all about — being sure the “whole” is healthy and productive, not just your little piece of it!

*being sure the  
“whole” is  
healthy and  
productive, not  
just your little  
piece of it!*

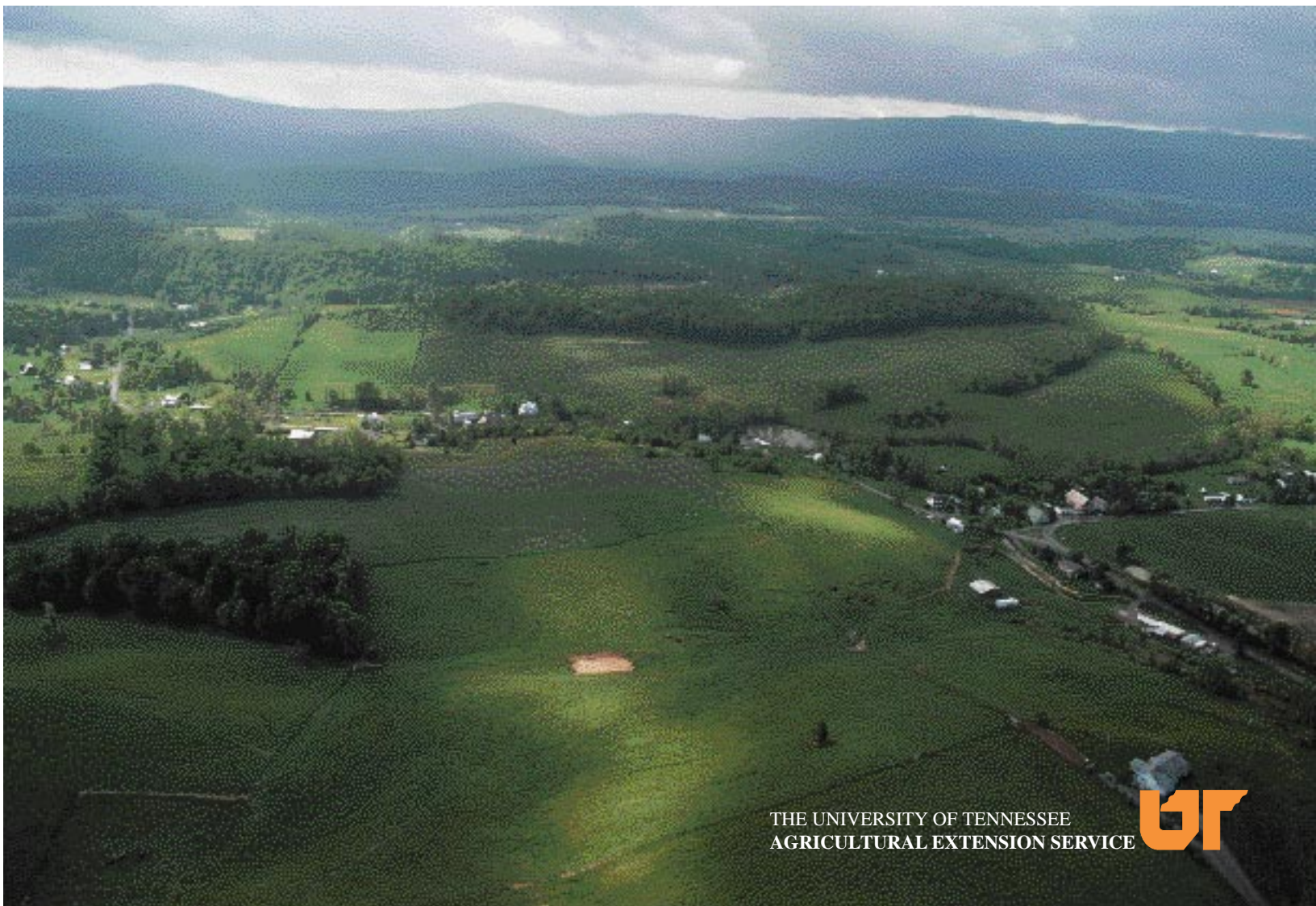




### III. Moving Land Stewardship Forward - An Example

**S**o far we have discussed the evolution of ecosystem management, and the various scales of management that are needed to achieve multiple objectives. We also agree that proper land stewardship begins at home. To emphasize this point, let's visit a working farm in southwest Virginia to see how real landowners are working with the land, and adjusting the scale of management, to achieve their objectives.

The Sycamore Meadows Farm (misspelling of "sycamore" intentional) has been in the family for two generations, and since the early 1900s has supported a beef cattle operation. Situated in the picturesque Cripple Creek Valley of Virginia, this 166-acre property consists of a mixture of active and abandoned pastures, woodlots, a Christmas tree plantation and a riparian zone along Cripple Creek, a free-flowing, crystal-clear trout stream. On this farm the owners blend their agricultural production with their natural resources to (a) have an economically viable operation, and (b) maintain the high environmental quality found in the Cripple Creek Valley.





The current land uses on the Sycamore Meadows Farm are outlined in Table 1. Obviously, the land is well-used, with the majority already under active management. The management objectives of the owners are probably typical of those of most rural landowners in the South. They wish to continue their profitable beef cattle operation, using existing pastures. They also want to minimize soil erosion, preserve the quality of water in Cripple Creek, develop a profitable Christmas tree operation, produce marketable timber from their woodlots, enhance wildlife habitat (principally for songbirds, birds of prey and deer) and ensure the ecological health of the Cripple Creek watershed. This is obviously a tall order, and you can see that the higher levels of management are necessary for the owners to be successful.

To help them in their quest to be profitable farmers and good stewards of the land, the owners have joined the Forest Stewardship Program, run by the Virginia Department of Forestry. With the aid of professional foresters, the owners have developed a management plan for their property, and the stewardship program is available to provide some cost-share assistance to help implement it.



*landowner receiving stewardship sign*

**Table 1. Current land use on the Sycamore Meadows Farm and adjacent lands.**

Land Use	Sycamore Meadows Farm	Adjacent Lands
	acres	
Hardwood forests	41	58
Conifer forests	4	0
Active pasture	103	316
Abandoned pasture	0	22
Protected riparian	6	3
Unprotected riparian	0	7
Cropland	0	0
Christmas tree plantation	9	0
Developed (roads, bldgs., etc.)	3	9
<b>Total</b>	<b>166</b>	<b>415</b>

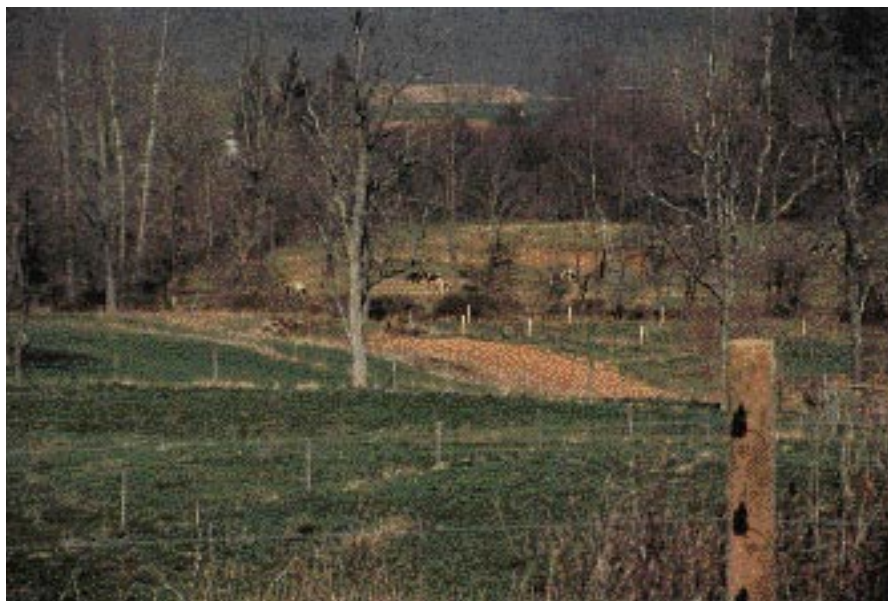




If stewardship begins at home, let's take a look at the management practices that the Sycamore Meadows Farm owners are now using, or have planned to implement in the near future. You can judge whether you think they have the proper approach, and you may wish to compare some of their practices to those that you use on your property.

### **A. Beef Cattle Operation**

To raise one calf to a marketable weight requires one to two acres of productive pasture, plus supplemental feeding with hay and/or silage, and an adequate supply of water. The owners have identified their most productive pastureland on the gentlest slopes, and have put in place a **rotational grazing system**, which involves moving cattle from place to place and more fencing. But it allows for more beef production on smaller acreage, preserves the health of the forage and reduces soil compaction and erosion. The owners have also installed a watering system that provides a source of clean, plentiful water, while keeping the cattle away from the stream. Adequate, high-quality and well-maintained electric fencing keeps the cattle in the correct pastures and out of the woodlot and Christmas tree plantation.



*fences and grazing system*

### **B. Soil Conservation**

The Sycamore Meadows Farm owners recognize the many benefits of good soil conservation. Precious topsoil keeps the pastures, woodlots and tree plantations productive. Also, topsoil that washes into the stream causes **siltation**, a major pollutant in trout streams. With cattle operations, soil compaction may be a potential problem. Hoof traffic can create a dense surface that allows more runoff, increases erosion and also restricts plant roots. This decreases the productivity of the land for both forage crops and trees. Rotational grazing and fencing cattle out of sensitive areas like woodlots and along streambanks greatly conserves soil quality. Also, the owners have removed cattle grazing from the steeper slopes, and placed those areas in Christmas tree production. This insures a continuous vegetation cover on the steepest areas of the farm, further reducing erosion.





### C. Water Quality

About 1,000 feet of Cripple Creek runs through the Sycamore Meadows Farm. Additionally, the farm has a large, flowing spring that feeds into the creek year-round. The most beneficial practice the owners have employed to enhance water quality is to fence the cattle out of the creek and away from the spring. This eliminates the problems of cattle destroying the streambank, increasing bank erosion and passing waste directly into the water. The creek is still the source of water for the cattle, but a hydraulic ram was installed to move water up and out of the riparian zone. This is an effective, inexpensive way to provide water to cattle without damaging the stream.

But the owners' commitment to water quality doesn't stop with fencing. Additionally, they have planted a mixture of oaks, walnut and shrub species in the riparian zone, and protected these seedlings from animal damage with **tree shelters**. These seedlings will grow into large trees that will provide shade for the stream, cool the water and improve trout habitat. The heavily-vegetated riparian zone also serves as a filter strip, reducing pollutants like sediment, fertilizers and animal waste that may be carried by surface water during storms or spring snowmelt.

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*"The most beneficial practice the owners have employed to enhance water quality is to fence the cattle out of the creek and away from the spring."*

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*fencing along creek*



*watering station*



*tree shelter*





#### ***D. Christmas Tree Operation***

In 1994, the owners began a Christmas tree operation, putting three acres into Fraser fir production, with an additional three acres planned over the next couple of years. This operation serves dual purposes, providing a source of income and turning highly erosive, nonproductive, marginal farmland into a useful and profitable enterprise. In their operation, the owners are sure to keep a good ground cover around the young trees, to provide for adequate soil conservation. Chemical fertilizers are applied according to soil test recommendations, to avoid excessive applications. Likewise, pesticide applications are based on crop scouting and good ***integrated pest management*** (IPM) principles. Pesticides are applied in limited quantities, only when necessary to prevent an economic loss.

***"This operation serves dual purposes, providing a source of income and turning highly erosive, nonproductive, marginal farmland into a useful and profitable enterprise."***



*Christmas tree operation*



### **E. Timber Production**

The SycaMoore Meadows Farm currently has about 44 acres of existing woodlots. The largest woodlot is about 25 acres and consists of 60-year-old oaks, maples and cherries. In past years, cattle were allowed to graze freely across the entire property. This has resulted in the destruction of an understory in the woods. Natural regeneration, as well as saplings, is absent. Also, hoof damage to root systems and direct damage to tree trunks have resulted in much decay. As a result, the overstory trees have reduced quality and value. Typical of most woodlots in this condition, the first step toward improved health and vigor is to fence

out the cattle. This is now underway on the SycaMoore Meadows Farm. Once the cattle are removed, an **improvement cutting** is planned. This cut will remove trees that do not have value for timber or wildlife and will allow sunlight to reach the forest floor. This will stimulate an **understory** to develop, which will contain desirable tree seedlings as well as herbaceous and shrub species that will improve wildlife habitat.

The owners also plan to establish **crop tree plantations** on other marginal farmlands and to replace smaller woodlots that are too degraded to recover their economic potential. Both eastern white pine and

black walnut are planned for this purpose. Trees removed in these harvests will be used for fenceposts and firewood. The better quality, more valuable sawtimber trees will be left to grow for a future harvest.

*"the first step toward improved health and vigor is to fence out the cattle."*

*grazed hardwood lot*





### **F. Wildlife Habitat**

The owners of the SycaMoore Meadows Farm have identified increased populations of both deer and birds, mainly songbirds and birds of prey, as their wildlife objectives. The vegetation and land use patterns in the Cripple Creek Valley are well suited to support high numbers of white-tailed deer. The mixture of hardwood forests, abandoned, brushy fields and agricultural fields provides good food and cover. Perhaps the most limiting factor to deer is a lack of wooded **corridors** between fields that link isolated or fragmented woodlots.

*"the most limiting factor to deer is a lack of wooded corridors between fields that link isolated or fragmented woodlots."*



*lack of corridors*







At least 100 species of songbirds nest in the southern Appalachian region, using all types of cover. For example, eastern meadowlarks favor grasslands, Carolina wrens are found in shrubland, whereas wood thrushes, red-eyed vireos and scarlet tanagers occur in mature hardwood or hardwood/pine forests. On the Sycamore Meadows Farm, all of these types of vegetation are present. Because most songbirds build their nests within 15 feet of the ground, a well-developed understory is beneficial. The owners are improving such habitat by fencing cattle out of woodlots and shrubby areas. The owners are also erecting nesting boxes for bluebirds along fencerows between pastures.

Among the birds of prey common to the Cripple Creek Valley are owls, hawks and vultures. The owners of the Sycamore Meadows Farm are improving habitat for these birds by maintaining large, old trees in the woods and along the creek. These trees provide nesting platforms, cavities and hunting perches so that these predators can help manage populations of rodents and small game.



*nesting box*

*red-tail hawk*





### **G. Watershed Management**

The 166-acre Sycamore Meadows Farm sits within the 79,560-acre Cripple Creek Watershed. The headwaters of this valuable stream originate in the mixed hardwood forests of the Jefferson National Forest. Once Cripple Creek leaves federal land, it flows through a broad agricultural valley, where cattle production, hay and corn are the major land uses. Cripple Creek is a stocked trout stream within the national forest, and about two miles below the farm there is a successful commercial trout fishing enterprise.

The owners of the Sycamore Meadows Farm participate in a federally-sponsored watershed management project designed to protect the land and improve the quality of the water in Cripple Creek. Cost-share funds available through this project for practices that reduce erosion and improve water quality have been used to plant trees along the creek banks, and install fencing and the watering system to keep cattle away from Cripple Creek.

About 20 percent of the private landowners in the Cripple Creek Valley have participated in the watershed project since it began in 1987. More than 200,000 feet of fencing has been erected in the watershed, 80 livestock watering stations established, 650 acres of trees planted and several thousand acres of erodible lands seeded to grasses or strip cropped. Scientists

estimate that these practices have saved nearly 50,000 tons of topsoil from entering Cripple Creek as sediment.



*"The owners of the Sycamore Meadows Farm participate in a federally-sponsored watershed management project designed to protect the land and improve the quality of the water in Cripple Creek."*





## ***H. The Sycamore Meadows Farm and Scales of Management***

Clearly, the farm owners are now operating at the second level of management, which relates to the whole property. They have nicely integrated their multiple objectives and management practices across the entire farm. Stewardship of the land is a primary concern, as is an economically viable farming operation. But what about a higher level of management? Could the owners better achieve their objectives by coordinating their practices with their neighbors?

There is little doubt that, for some objectives, this is definitely the case. For example, water quality in Cripple Creek would be further enhanced if, in addition to the owners of Sycamore Meadows Farm, their neighbors engaged in **riparian zone** management. Fencing cattle out of a larger segment of the stream and planting more trees along the streambank would increase the impact manyfold. Wildlife habitat objectives would also benefit by coordinated management with adjacent landowners.

Establishing and maintaining wooded corridors to connect large woodlots frequently requires cooperation with neighbors. Well-developed and strategically located corridors allow wide-ranging wildlife species the opportunity to better exploit highly variable food resources, facilitate movement during breeding and provide necessary escape cover. Corridors also provide good hunting areas for birds of prey. Because

**home ranges** for songbirds often cross property lines, encouraging neighboring farmers to fence cattle out of woodlots would improve songbird habitat over a broader area.

Obviously, not all landowners share the same objectives and, in some cases, objectives may conflict. For example, while one owner may want more deer, an adjacent owner may view deer as pests. There are no easy solutions to these problems, but probably the best way to deal with neighbors who differ with you is to focus your efforts on those objectives on which you do agree. Once a positive working relationship has been established, it may be possible to explore some of the objectives that are not mutually shared.

*"Could the owners better achieve their objectives by coordinating their practices with their neighbors?"*

*landowners*



*"There is little doubt that, for some objectives, this is definitely the case."*



## IV. Conclusion

**I**ncreasing the level of management to better achieve your objectives and to benefit a larger area is the heart of ecosystem management. In this publication, we have explained our view of how this concept may alter natural resource management on private ownerships in the South. It is important to remember that this is not a radical, new idea. Rather, it is simply an extension of the multiple-use idea that has been around for more than 30 years. The ultimate goal is the improved health and productivity of our forest ecosystems.

If you are interested in improving the management of your land — get help. Talk to your local county Extension agent and state agency forester. Seek out information and engage the services of a professional natural resource manager to help you prepare a plan for your property. The quality of our environment tomorrow depends upon the actions you take today. The Forest Stewardship Program, available through your state forestry agency, may be a great place for you to start.

***"The quality of  
our environment  
tomorrow  
depends upon  
the actions you  
take today."***



*forester and landowner*



## APPENDIX: MANAGEMENT PRACTICES TO KEEP ECOSYSTEMS HEALTHY

### I. Using Best Management Practices (BMP's)

Best Management Practices (BMP's) are guidelines mostly aimed at protecting water quality. Specific operations include the use of culverts or bridges where roads cross drainages and the use of **waterbars** or **water breaks** to divert runoff from roads into the forest. These diversions allow the forest floor to trap sediment and keep it out of streams. More water diversions are necessary for roads built on steep slopes because these roads are subject to more erosion. Most loggers voluntarily comply with these practices. State forestry agencies can help landowners understand and adhere to BMP's.

*building water bar*



### II. Establishing Riparian Zones

Riparian zones are vegetative buffer strips along streams or around ponds and lakes. The main purpose of forested riparian zones is to prevent pollution of stream and pond waters. The forest floor within the zone filters sediment from runoff waters, and trees shade and cool the stream or pond water. Riparian zones also provide cover, food, nesting sites and travel corridors for wildlife species such as turkey, deer, bear, squirrels and songbirds.

Proper best management practices may be used to create riparian zones. Normally, a minimum of 50- to 150-footwide strips of trees, often referred to as streamside management zones (SMZ's), are left along streams and shorelines. They are also desirable along intermittent streams in very steep areas or in large drainages. Some trees may be harvested within the zones, but harvesting machinery should be restricted. Forestry consultants and county foresters can help landowners establish riparian zones and mark the boundaries before timber harvests.

*riparian zone*



### III. Developing Wildlife Corridors

Corridors are linear strips of vegetation that connect similar types of habitat and have value to wildlife. Forested corridors are especially beneficial in large agricultural regions. These vegetated strips provide cover and protection during travel for species like deer, bear, squirrels and turkeys. These animals do not like to travel in open fields. Fencing livestock from a corridor prevents browsing and trampling of understory vegetation by cattle, which diminishes the food and cover value for wildlife. In agricultural areas, corridors with mature trees and brushy “soft” edges provide optimum value to wildlife. Corridors that are not fenced or do not have brushy edges may still provide value, primarily as travel paths.

Wooded wildlife corridors may be created by allowing natural vegetation to grow or by planting trees in strips to connect isolated woodlots to larger forested areas. Brushy edges can be created and maintained by mowing alternate 5- to 10-foot-wide swaths along the outer edge of a corridor every three to five years.



Your county Extension agent, forester or wildlife biologist can help you properly locate, design and create wildlife corridors on your property.

*"In agricultural areas, corridors with mature trees and brushy “soft” edges provide optimum value to wildlife."*

### V. Managing Den Trees and Snags

**Den trees** have holes or cavities and may be alive or dead. **Snags** are trees in a state of decline and can be either solid or hollow. Den trees and snags provide nesting and feeding habitat for a variety of wildlife species, including raccoons, squirrels, bears, woodpeckers, wood ducks and owls. Birds of prey also use snags to perch on so they can see prey at long distances.

One to five den trees per acre should be left on the site when the surrounding trees are harvested. They will attract wildlife to the recently harvested area and will not affect forest regeneration. It is best to identify and flag these trees prior to the harvest. Loggers should be given instructions to leave the flagged trees standing for wildlife habitat.



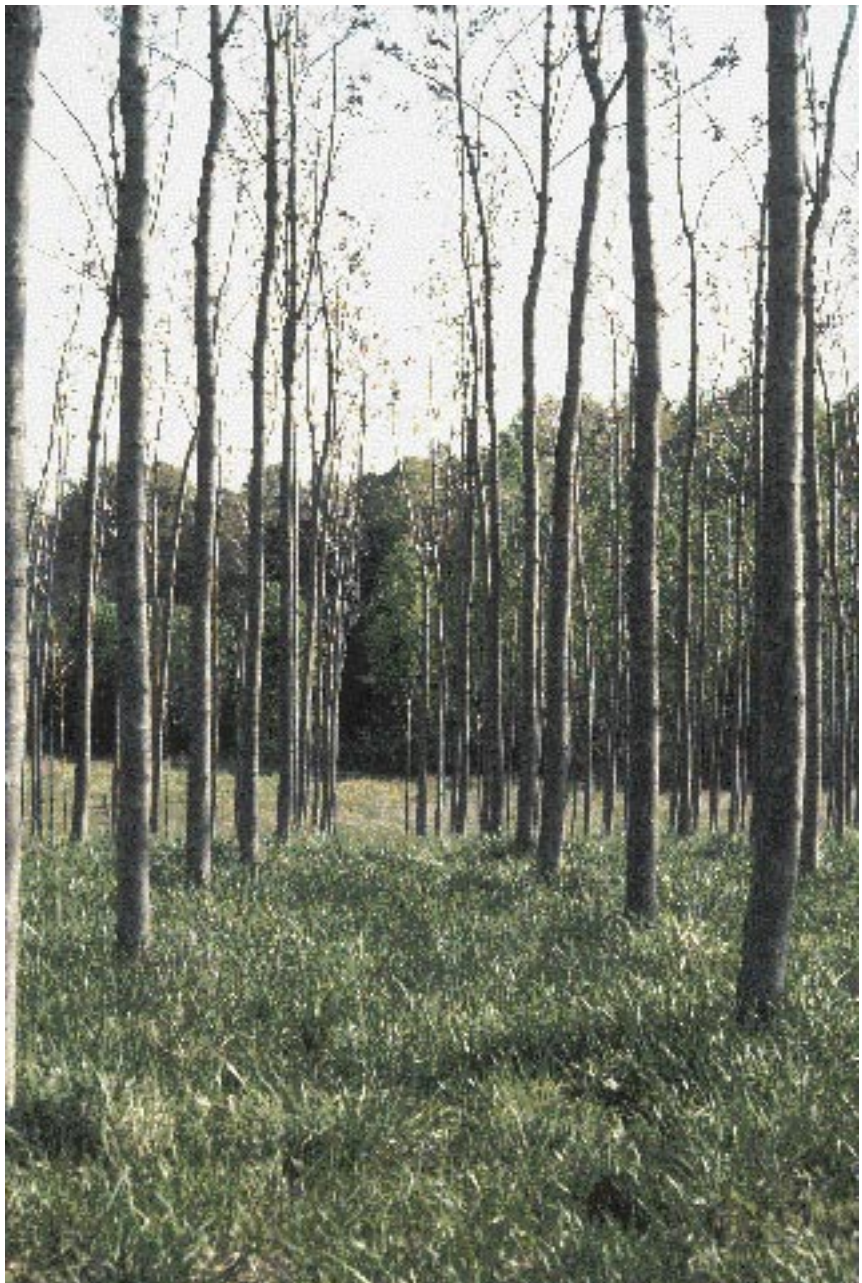


## VI. Planting Tree Crops

Tree crops are suitable for marginal agricultural land, which can be highly erodible when tilled regularly. Tree crops can be profitable on these sites and tend to be more environmentally sound because the soil is not tilled every year. In most of the Southeast, loblolly pine grows well on marginal sites and is profitable. Other popular crops are Christmas trees, white pine, black walnut and royal paulownia.

State or federal financial assistance is often available for landowners who wish to convert their marginal cropland to forested land. To learn more about this practice and its incentives, contact your county Extension agent, Natural Resources Conservation Service office or county forester.

***"State or federal financial assistance is often available for landowners who wish to convert their marginal cropland to forested land."***



*Paulownia plantation*



## VII. Managing Forest Pests

Forest pests include both large and small animals. Many insects can be very damaging to forests, but two common ones in the South are pine beetles and gypsy moths. The southern pine beetle attacks all southern yellow pine species and can kill entire stands very quickly. These insects favor slow-growing, **over-stocked** pine stands. Pine beetle risks can be reduced by thinning pine stands before their growth stagnates. However, once a large population of pine beetles is established in an area, all pine stands are at risk, including healthy ones. Neighbors can work together to reduce southern pine beetle damage.

Neighbors can also cooperate to fight the gypsy moth, a leaf-eating, non-native caterpillar that is working its way south. The gypsy moth feeds on leaves of deciduous trees such as oaks and fruit trees. Losses may be reduced by managing for healthy, vigorous forests of less-susceptible species. Occasionally, insecticide spraying is necessary to protect high-value trees. Companies providing this service require large tracts of land to spray. Hence, landowners in the South can cooperate to put enough acres of land together for spraying. In both cases your county forester can assist you in arranging these activities.

Insects are just one part of the pest problem in southern forests. A host of other animals, both large and small, can also cause problems

by devouring vegetation, damming streams, rubbing young trees and other activity. Deer browsing and antler rubbing are problems in some areas. Beavers are legendary for their skill at blocking culverts and creating ponds. Rabbits, mice and voles also can cause problems in some areas. Pest birds such as cowbirds are notorious for their ability to parasitize nests of other songbirds. Direct control of these animals is not always possible, due to their large numbers and the free range they enjoy. In some cases,

*"Neighbors can work together to reduce southern pine beetle damage."*

skill at blocking culverts and creating ponds. Rabbits, mice and voles also can cause problems in some areas. Pest

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*Southern pine beetle*



indirect control methods, such as using tree seedling shelters and repellent sprays, are effective in the short run. Often, simply adjusting management objectives to account for pest problems is the best solution.



*"landowners in the South can cooperate to put enough acres of land together for spraying."*

*gypsy moth egg masses*







## VIII. Creating Edge Habitats

**Edge** occurs where the boundaries of different cover types, land features or land use practices join one another. When drastically different habitats meet and form an abrupt vertical contrast, this boundary is called a “hard” edge. A “soft” edge refers to different habitat types that meet and mix together in gradual transition, creating an area with some characteristics of each habitat. Hard edges appear cleaner, but lack sufficient structure or depth to be useful as habitat; while soft edges exhibit greater habitat structure and support a greater diversity of plants and wildlife. The increased cover and forage found in soft edge habitats benefit songbirds and gamebirds, and a variety of mammals.

Soft edge habitats can be easily created and maintained by most landowners. For example, where a pasture meets a mature forest stand, a few trees along the fence could be cut down, thereby “softening” the edge. Tree seedlings, brush and taller grasses that regenerate in the freshly cut area increase the structural complexity and thus provide greater habitat diversity. Selectively mowing segments of the area every three years will help maintain this soft edge. Soft edges can also be created by cutting borders around croplands, planting shrubs along the edges of mature woodlots or allowing hedgerows to grow along fencelines.

*"soft edges  
exhibit greater  
habitat structure  
and support a  
greater diversity  
of plants and  
wildlife."*





## IX. Fencing along Streams

Fencing along streams is a best management practice used to reduce erosion and improve water quality by keeping livestock out of waterways. This practice is especially beneficial for fisheries and aquatic habitat. Streambank erosion can be severe when livestock are allowed to consume and trample the vegetation along the waterway. Fencing preserves ground cover, which minimizes runoff.

Fencing along streams also reduces pollution loading by preventing animal wastes, which can cause high nitrate and fecal coliform levels, from entering the stream. Also, the vegetative buffer that grows on a protected streambank helps to filter pesticides or fertilizers that may be carried in runoff from the adjoining pasture or cropland.

Best management practices suggest fencing a minimum of 10 feet from each streambank. Alternative watering sources may be used to provide water to livestock and eliminate the need for stream access. These include diversion of some clean stream water to stocktanks, pumping water from a stream or spring, or using a well and an inexpensive ram. Sometimes it is essential that cattle cross streams. Use of gravelled, controlled access points can limit stream bank damage. These options ensure clean water to your neighbors downstream.



*stream fencing*

## X. Fencing Woodlots

Fencing livestock from wooded areas is essential for a healthy forest. Cattle damage forests by compacting the soil around tree roots and trampling or eating the forest understory. These impacts harm mature trees and prevent new ones from growing. Grazed forests often resemble parks, with bare land and exposed tree roots. While this may be visually appealing, it indicates an unhealthy forest. Furthermore, livestock compete with wildlife and consume available food resources, such as acorns and **browse**. Fencing your woods decreases the chance of your livestock's consuming potentially poisonous vegetation, such as cherry leaves or acorns. If your livestock need shade, you can run a fence inside the tree line and protect both your livestock and your forest.

Fencing your woodlot may be costly and labor-intensive. Electric fences may be less expensive and more easily installed than conventional fencing. The use of cost-sharing programs, such as the Forest Stewardship Program, may help pay for fencing. Ask your county Extension agent or forester about this practice.



*woodlot fencing*



## ***XI. Crop Tree Management***

Crop trees are the trees that you, the landowner, select to favor and grow to a defined optimum age. They are selected because their species, size, function and other properties that best meet your management objectives. You may select crop trees for wildlife, timber, shade, aesthetics, sound buffering capabilities or any other reason. A natural resource professional can help you in identifying and

One way to manage eliminate competing trees by them or injecting them with an favorable if you can use or sell injecting them may suit you increase habitat for Girdling or injecting results in damage your crop trees when they eventually fall. In any case, eliminating competing species will reallocate more of the site resources (water, nutrients and sunlight) to your crop trees and help them flourish.

*"They are selected because their species, size, function and other properties that best meet your management objectives."*

managing crop trees. crop trees in a forest is to either cutting them, girdling herbicide. Cutting them may be firewood, while girdling or better if you would like to woodpeckers or birds of prey. dead standing trees that could

You can also manage crop trees through pre-harvest planning and/or reforestation. When harvesting, you can favor the regeneration of certain tree species according to the time of year or harvest method. For this operation, a consultant or county forester is an essential resource. Furthermore, during reforestation you can plant new crop trees or remove unwanted stump or root sprouts.

*veneer white oak*





## ***XII. Wetlands***

Often, people consider having a wetland on their property to be a disadvantage. They see such areas as wasted or unproductive space. In fact, wetlands can serve many useful functions, providing such things as wildlife habitat, a water reservoir during dry periods, recreational areas and timber production. A single wetland will often provide a combination of these or other purposes.

Wetlands provide food, shelter and water for many fish, birds and mammals. Some animals depend on wetlands for their survival; others (particularly migratory birds) use wetlands on a seasonal basis. Wetlands are important components of the food web. The decay of leaves, stems and other organic matter within a wetland provides food for aquatic invertebrates, which in turn are eaten by fish and birds.

Wetlands can also help improve water quality by filtering out sediment and pollutants contained in waters which flow through on the way to streams, rivers and lakes. The vegetation growing in wetlands helps slow down the speed of floodwaters, allowing sediment and other pollutants within the water column to settle out. Wetlands can function as storage basins for floodwaters originating from riverbank overflow or as storage for water moving across upland surfaces into depressions. The combination of decreased water speed and provision of a floodwater storage area can mean that downstream areas will experience less severe flooding depths and

decreased erosion. Wetlands also help maintain a steady flow in streams during times of drought, and provide places where groundwater recharge can occur.

Wetlands can offer many opportunities for recreational activities such as hunting, fishing, bird watching or boating. The condition of a wetland and its ability to meet these and other needs are dependent on the management of upland areas. Wetland systems add another dimension to the pattern of diversity needed to maintain high quality wildlife habitat and overall ecosystem health and vigor.

Protection of wetland resources within a landscape will probably require cooperation among landowners, because the quality of a wetland is dependent on the quality of water entering it and the activities taking place on adjacent uplands. In addition, wetlands often extend across landowner boundaries. These areas present landowners with unique challenges, but with proper management, they also offer many opportunities to improve wildlife habitat, water supply and recreation.

*"wetlands can serve many useful functions, providing such things as wildlife habitat, a water reservoir during dry periods, recreational areas and timber production."*

*"Protection of wetland resources within a landscape will probably require cooperation among landowners,"*



### ***XIII. Creating Habitat Diversity***

Most wildlife species require or benefit from habitat diversity, a mixture of habitat types. Greater habitat diversity provides cover, forage, water, movement corridors and predator protection for wildlife in a small area. Wild turkeys are a good example of a species needing habitat diversity; they require mature forests for roosting and forage, fields for nesting and “bugging,” and younger forests for the protection of thick cover. Deer, bear, grouse and songbirds are other popular species that benefit from habitat diversity.

The first step in creating habitat diversity is to identify the habitat types needed by the wildlife species you are targeting. Next, survey your property (and your neighbors’ if possible) to identify the habitat types already present. A county forester, private consultant or wildlife professional can help you in doing this. Furthermore, a resource professional will be essential in the next step — deciding where, when and how to create the desired habitat diversity on your property through a prescribed management plan. A professional can also help you secure cost-share assistance for approved management activities through state stewardship or conservation programs. The final step is to carry out the prescribed operations on your property and perform necessary maintenance.

***"Most wildlife species require or benefit from habitat diversity, a mixture of habitat types."***

*habitat diversity*





## ***XIV. Glossary***

**Aesthetics:** The visual characteristics of a particular site or area.

**Best Management Practices (BMPs):** A set of rules, designed to protect water quality, regarding forest road installation and timber harvesting. They are voluntary in some states and mandated by law in others.

**Biological Diversity:** The variety of life forms in a given area. Diversity can be categorized in terms of the number of species, the variety in the area's plant and animal communities, the genetic variability of the animals, or a combination of these elements.

**Bugging Field:** A field used by wild turkeys and other bird species as a forage area for insects. Young turkeys have high protein requirements, and insects are a good protein source.

**Buffer Strip:** A narrow zone or strip of land, trees or vegetation bordering an area. Common examples include visual buffers, which screen the view along roads, and streamside buffers, which are used to protect water quality. Buffers may also be used to prevent the spread of forest pests.

**Clearcut:** A harvesting and regeneration technique in which all trees on an area are removed at the same time. Clearcutting favors regeneration of trees requiring full sunlight such as pines, yellow-poplar and oaks growing from established root and stump sprouts. Clearcutting also results in a habitat favorable to many wildlife species.

**Competition:** The struggle between trees to obtain sunlight, nutrients, water and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

**Conservation:** The protection, improvement and wise use of natural resources to assure the attainment of their highest economic and social values in perpetuity.

**Cost-Share Assistance:** An assistance program offered by various state and federal agencies that pays a fixed rate or percentage of the total cost necessary to implement some forestry or agricultural practice.

**Cover:** A vegetative shelter which can (a) protect erodible land by intercepting raindrops and holding soil in place, and/or (b) provide protection for wildlife from predators or inclement weather.

**Crop Tree:** Any tree selected over adjacent trees to be grown to maturity or a selected size due to its species, form or function according to the landowner's objectives.

**Cruise:** A survey of forest land to locate timber and estimate its quantity and quality according to the landowner's objectives.

**Cull Tree:** A tree identified for removal due to its species, form or function not meeting the landowner's objectives.

**Culvert:** A concrete, metal or plastic tube used to allow normal stream flow at a road crossing. The culvert is located in the fill on which the road is built.

**Ecology:** The science of the relationships between organisms and their environment.

**Ecosystem:** An interacting system of living organisms, soil and climatic factors.

**Edge:** The transition between two different types or ages of vegetation.

**Endangered Species:** A species whose total number of remaining members may not be sufficient to reproduce enough offspring to ensure its survival.

**Environment:** The interaction of climate, soil, topography, plants and animals in any given area. An organism's environment influences its form, behavior and survival.

**Erosion:** The wearing away of land or soil by the action of wind or water.



**Forage:** Vegetation such as leaves, stems, buds and some types of bark that can be eaten by wildlife for food and energy.

**Forestry:** The science of forest management.

**Fusiform Rust:** A disease that affects southern pine trees, resulting in bole and limb cankers which destroy wood quality, ruin tree form and weaken the tree. The tree eventually dies, is blown over by wind, or is killed by a subsequent pathogen.

**Gypsy Moth:** An exotic insect that is working its way south from New England. Its larvae (caterpillars) feed primarily on a variety of deciduous tree species (oaks, fruit trees, beech, and others) and can strip entire forest stands of their foliage. The gypsy moth can kill such stands in two to three years unless it is controlled by pesticide spraying or naturally migrates away from the area.

**Habitat:** (a) An area in which a specific plant or animal can naturally live, grow and reproduce; (b) For wildlife, the combination of food, water, cover and space.

**Herbicide:** A chemical mixture that kills plants.

**Improvement Cut:** An intermediate timber cut made to improve the form, quality, health or wildlife potential of the remaining timber.

**Marginal Land:** Land that does not consistently produce a profitable crop because of infertility, drought, or other physical limitations such as shallow soils.

**Mast:** Fruits or nuts used as a food source by wildlife. Soft mast includes most fruits with fleshy coverings, such as persimmon, dogwood seed or blackgum seed. Hard mast refers to nuts such as acorns and beech, pecan and hickory nuts.

**Multiple Use:** The management of land or forest for more than one purpose, such as wood production, water quality, wildlife, recreation, aesthetics or clean air.

**Pest:** Any organism that is out of place or causes stress to a desired organism.

**Pesticide:** A chemical mixture which kills pests.

**Poult (Turkey):** A young turkey.

**Preservation:** An attempt to keep forests in an undisturbed state through the control of internal and external influences.

**Riparian Zone:** An area around bodies of water in which vegetation exists in its natural stratified state.

**Reforestation:** Reestablishing a forest by planting or seeding an area from which forest vegetation has been removed.

**Sedimentation:** The deposition or settling of soil particles suspended in water.

**Southern Pine Beetle:** An insect which feeds on the cambium layer of all southern yellow pine species. Southern pine beetles favor overstocked pine stands and can kill entire stands very rapidly.

**Stewardship Program:** A cost-sharing program available to forest landowners and administered by state forestry departments. In general, state foresters develop a stewardship plan for the property and then approve certain activities for cost-sharing, such as fencing of woods, soil and water protection, and wildlife habitat enhancement.

**Species:** A group of related organisms having common characteristics and capable of interbreeding.

**Stand:** An easily defined area of the forest that is relatively uniform in species composition or age and can be managed as a single unit.



**Streamside Management Zone (SMZ):** An area adjacent to a stream in which vegetation is maintained or managed to protect water quality. The width depends on slope, but 50 feet is the normal minimum. Trees may be removed from SMZs as long as the stream bed is not disrupted and sufficient vegetation and intact forest floor is left to protect water quality.

**Timber Stand Improvement (TSI):** Improving the quality of a forest stand by removing or deadening undesirable species to achieve desired stocking and species composition. TSI practices include applying herbicides, burning, girdling and/or cutting.

**Understory:** Vegetation occupying the lower strata in a forest such as seedlings, saplings, herbaceous species and shrubs.

**Water Bar:** A diagonal ditch or hump in a trail or road that diverts surface runoff to minimize soil erosion and stream sedimentation.

**Watershed:** The entire land area from which all water flows to a central point; the size depends on the chosen water flow point.

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