

By **Bob Keefe**, Retired Forester, Cullman

(Editor's Note: Part Two of a Two-Part Story)

Alabama is a state that is blessed with a wealth of biological diversity. Our beautiful state ranks fourth in the nation in species biodiversity, even though we rank only 29th in size. Even more significantly, we rank second in the nation behind Florida in the total number of species per acre. It is probably no surprise that most of this richness in biodiversity is found along the 47,000 linear miles of perennial and intermittent streams that make up most of our state's vast network of waterways.

Part One of this article presented the riparian forest concept as an important way to help sustain our biological inheritance by providing a commitment to stewardship that goes well beyond the limited objectives of the present Best Management Practices (BMPs) Streamside Management Zones (SMZs). It demonstrated that managing streamside areas as riparian forests provide many benefits to the landowner and his neighbors. These benefits include cleaner water through the increased soil and vegetative filtration of runoff water for sediment and other pollutants, a greater diversity of terrestrial and aquatic wildlife habitat, and better stream bank and water channel stabilization, especially on intermittent streams where timber cover is not required by BMPs. Riparian forests also provide many aesthetic or visual quality benefits, and very importantly, create manageable units for high value timber production.

PLANT STRUCTURE AND BIODIVERSITY

In managing riparian forests, understanding "plant structure" can be a very helpful tool. It is no surprise that in the

natural world, plants provide the physical structure within which most other organisms live. In general, species richness or biodiversity, is correlated with the structure of the plant community: the greater the diversity of plant structure, the greater the diversity of other life. Thus a major key to establishing and maintaining a healthy and species rich riparian forest is through providing a diversity of plant "structure." Small, well-structured riparian forests strategically located throughout the landscape can really do a lot to help the forest community promote its forest sustainability goals by being the repository for a wealth of biological diversity. It is this biological richness — the summation of all the varied of species of plants, animals, microbes, etc. that co-exist in a given location — that ultimately will measure how successful we have been in passing this great resource along to future generations of Alabamians.

Plant structure can be described in several different ways, but the most common way to assess plant structure is by its vertical and horizontal components. Simply put, vertical structure focuses on the complexity of the forest from ground level up to the top of the tallest trees and is often described by the canopy layers present. The more complex the vertical structure, the more canopy layers can be seen. A positive correlation exists between foliage vertical diversity and bird species richness in many plant communities on all continents. Horizontal diversity on the other hand, focuses on the diversity of plant life and conditions that promote a diversity of life as one moves across the forest floor such as the number and distribution of various species, size classes, age classes, number of snags, fallen timber, litter, etc.

MANAGING FOR PLANT STRUCTURE

Managing for a well-structured riparian forest may be the single most important thing a landowner can do to promote biological diversity and sustainability on his land. The primary silvicultural system that can be used to accomplish this is uneven-aged forest management, particularly using single tree or group selection methods. This is a complex process that requires a good understanding of plant succession and the effect of light and shade in creating and maintaining the desired forest structure. This method can also yield high quality forest products, both pine and hardwood, if not allowed to degenerate into a high grading operation.

An uneven-aged forest is defined as a forest in which at least three distinct age classes, or generations, of trees coexist. This usually involves mature trees in the upper canopy, large saplings in the mid-story, and seedlings or small saplings near the forest floor. If managed correctly, this can create the desired vertical and horizontal structure. This method of forest management basically involves the creation of small openings in the forest canopy through the harvesting of mature trees. This enables other under-story trees to respond to the increased sunlight in order to grow into the upper canopy. Light and shade must be delicately balanced to keep a viable under-story layer in reserve, to protect stand structure, and to prevent log quality degrades through epicormic branching, thus maintaining the biological and economic potential of the stand. There is a significant body of research available today on how to accomplish this for both hardwood and pine management. Professional forestry assistance is desirable when attempting

to manage the complexities of uneven-aged management.

INVASIVE EXOTIC SPECIES

One of the greatest threats to the riparian forest in Alabama is the invasion of exotic species. Probably the worst problem species today in riparian areas are Chinese and Japanese Privet. Some authorities call privet the second most invasive species in the Southeast after kudzu; others claim it will be worse. A cursory examination of stream zones across Alabama will show that privet has become so well established that it is replacing many native species through its intense competition. It grows so thick and lush, it prevents the regeneration of many native forest species and makes the riparian area almost inaccessible. Over time many riparian areas may be converted to pure privet thickets. Although it does have some wildlife value in its numerous edible berries and thick cover, its damaging effect on biodiversity and the economic potential of the stand makes it extremely undesirable. It is certainly not as pleasing aesthetically to most people as the naturally diverse riparian forest.

The only sure control for privet so far is chemical herbicides. Herbicides are effective when used properly and can restore the natural balance of the riparian forest. However care must be taken when using them in riparian areas not to spray directly into water even if the herbicides are labeled for wetlands use. Herbicides that are effective against privet include foliar sprays of Accord, Roundup, and Arsenal AC and bark applications of Garlon 4. Prescribed burning may be effective as a temporary above-ground control of privet when repeated regularly, but will not usually eradicate it.

Other invasive exotic species existing in Alabama and creating serious problems are cogongrass, popcorn tree, Japanese honeysuckle, kudzu and others. As with privet, the main problem is that they compete with native species for soil nutrients, water, and sunlight and eventually take over a site and eliminate or severely reduce populations of the native species and thus reduce biodiversity. This is extremely critical when they invade riparian forests, the foundation of

biodiversity in Alabama. For control measures against invasive exotic species to be most effective, early detection is required so that controls can be implemented before exotics become too well established. Otherwise eradication can be extremely difficult and expensive.

RE-ESTABLISHING DISTURBED RIPARIAN AREAS

Most of our stream corridors in Alabama have been disturbed by past or present land use patterns such as agriculture, forestry, grazing, strip mining, flood control measures, urbanization, and development. In some of these areas riparian forests can be reestablished or improved with cost share programs presently available to landowners. For example, programs exist that provide incentives for livestock owners to fence livestock away from streams. This allows riparian areas to develop by protecting them from overgrazing. It also protects the integrity of the stream banks, a major source of sedimentation, while reducing animal fecal bacteria and other pollutants from entering our streams. Cost share programs available through the Natural Resource Conservation Service (NRCS) and local county Soil and Water Conservation Districts can help with the cost of fencing off creeks and providing alternate water sources for livestock such as spring development, ponds and troughs as well as providing stream crossings.

The Continuous Conservation Reserve Program (Continuous CRP) is a USDA program that assists landowners in establishing riparian forests along creeks adjacent to pastures and crop land. Cost sharing through Continuous CRP covers tree planting for selected species of hardwoods and pines to establish a diverse riparian forest buffer, limited herbicide work for site preparation, and fencing out livestock along an average buffer width of 180 feet either side of the creek. In some cases, cost share programs will help establish up to a 300-foot riparian forest buffer on larger flood plains. This land is retired from agricultural production for a contracted period of time, usually 10 or 15 years, and annual payments are made to the landowner on land that is established in trees. This program is managed by the

Farm Service agency (FSA) with technical assistance from NRCS.

THE RIPARIAN FOREST, A COMMITMENT TO STEWARDSHIP

Maintaining our precious legacy of biodiversity and ensuring that it is not lost to our children and grandchildren by shortsightedness should be a stewardship goal of all Alabama landowners. One major way that this can be accomplished is through proper management and protection of the riparian areas of our state, where much of this biodiversity exists. These areas can be managed to protect these valuable assets without compromising the economic goals of the forest landowner and can even enhance them if done properly.

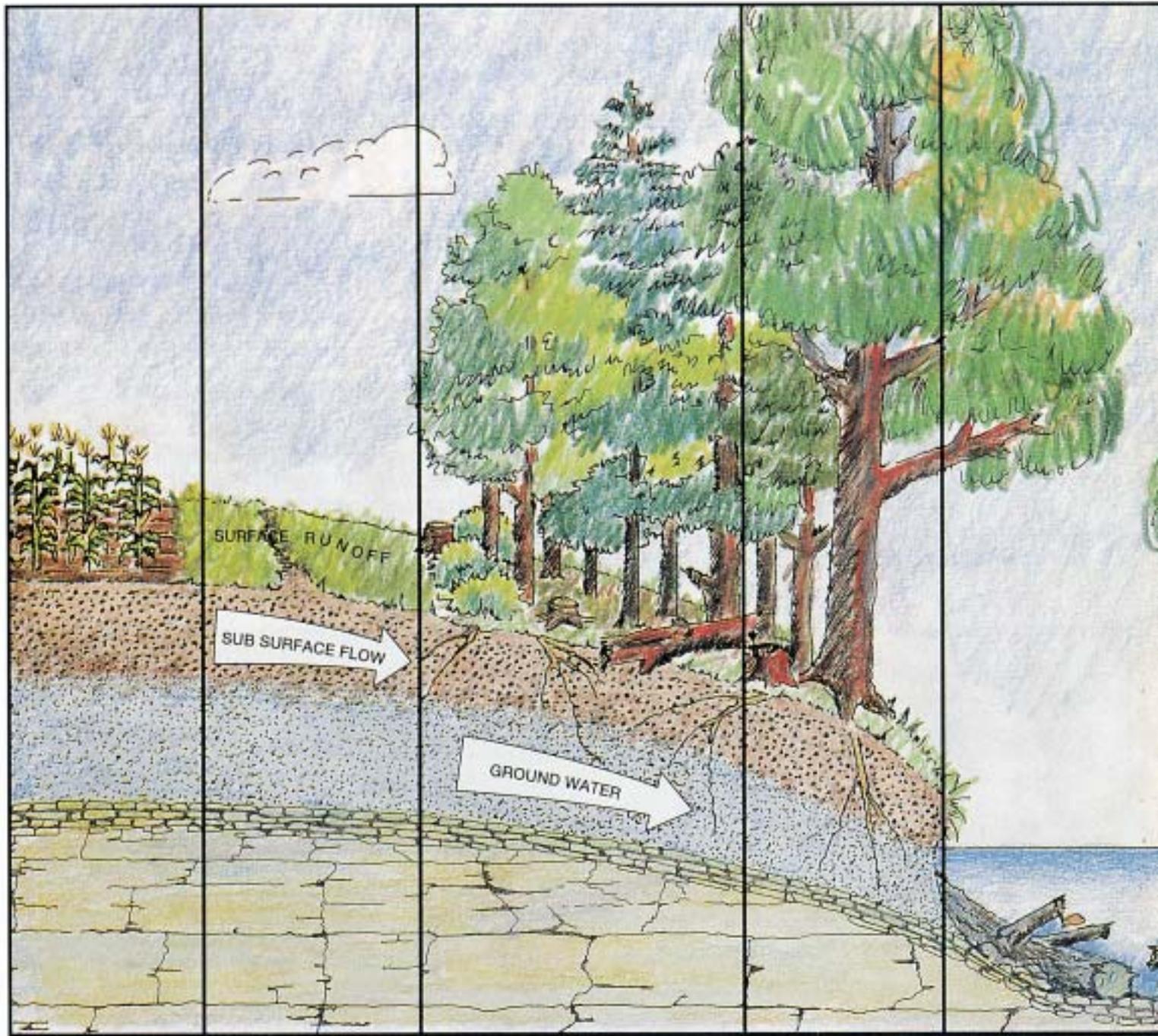
Riparian forest management is a complex issue, but there is technical expertise available to help the interested landowner through forestry consultants as well as agencies such as the NRCS, Soil and Water Conservation Districts, the Alabama Forestry Commission, and County Extension Service offices. ♣

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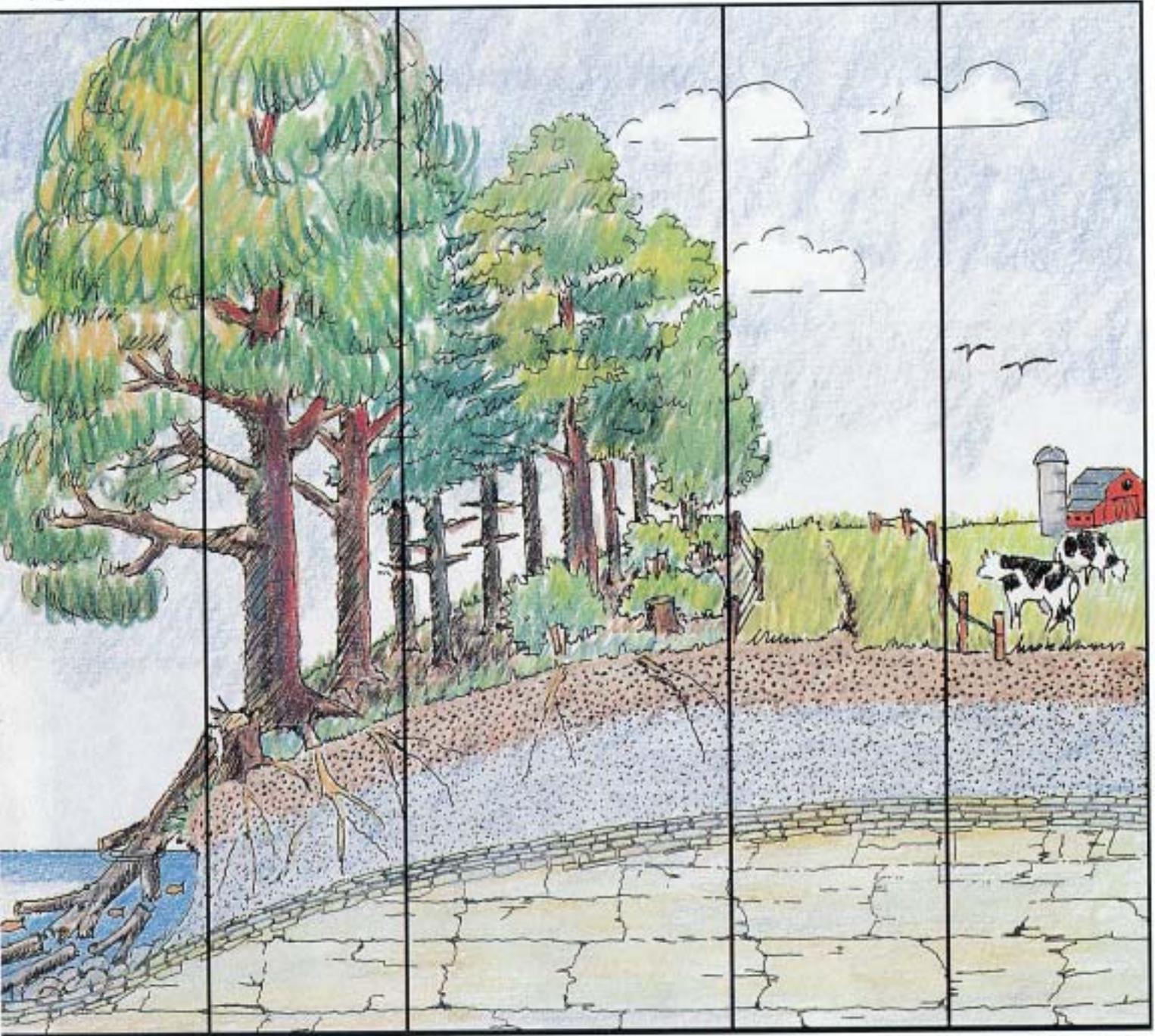
The Riparian



AGRICULTURAL	ZONE 3	ZONE 2	ZONE 1	STREAMBED
Cropland	Grass	Managed Forest	Undisturbed Forest	
Farmers employ Agricultural Best Management Practices.	Grass helps to evenly spread surface waterflow and absorb nutrients.	Trees can be harvested. Organic soils remove nitrogen.	Tree roots help stabilize streambank.	Woody debris slows velocity of water and improves aquatic habitat.

A riparian buffer is an area of trees, shrubs and herbaceous vegetation located adjacent to and upslope from a lake, stream or other body of water. This buffer serves several important functions. Simply put, it maintains stream system integrity, protects water quality and improves the habitat of plants and animals on land and in the water.

Forest Buffer



Above diagram courtesy of the U.S. Forest Service, Northeastern Area State & Private Forestry.

STREAMBED	ZONE 1	ZONE 2	ZONE 3	URBAN/SUBURBAN
Woody debris slows velocity of water and improves aquatic habitat.	Undisturbed Forest Trees shade stream and keep water cool.	Managed Forest Soil particles trap phosphorus, and trees use excess nutrients for growth.	Grass Porous grass-covered land increases infiltration and water storage. Controls concentrated runoff.	Developed People practice conservation measures.

The width of a riparian forest buffer is site specific and dependent on the landowner's objectives. The three-zone buffer concept provides a framework for the establishment and maintenance of a long-term riparian buffer.

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