FORUM

North, South, East, or West—Suiting Farms to Their Environments

Agriculture can provide ecological services that benefit farmers, the environment, and rural and urban communities that are often very far from the farms themselves.

That is one of the goals of the ARS Natural Resources and Sustainable Agricultural Systems Research Program. All our many locations across the country—in more than 35 states—take into account the ecology of the natural landscape on which the farm or ranch is located. Our scientists want to figure out the best way to manage this land without harm, with the lowest possible cost and risk, and for the highest possible return, at the same time staying consistent with long-term sustainability.

While all the research locations follow these principles, the ways in which they are applied vary greatly. Researchers—like farmers and ranchers—must adapt to the very different ecosystems that make up this large and diverse country.

For example, farmers in Appalachia face a rugged, mountainous terrain that sets its own rules—vastly different from those that apply to the corn-soybean ecosystems of the Midwest. Farms near ARS's lab in Beaver, West Virginia, are part of a large, natural ecosystem that functions as part of the "lungs" of the East Coast. It pumps out oxygen while taking in carbon dioxide, and it circulates life-giving water. The heavily forested, 197,000-square-mile Appalachian region exports an estimated 86 trillion gallons of water to much of the eastern United States.

As the story on page 4 shows, blending livestock grazing with forests is a way to farm while preserving wilderness. "Silvopasturing," as the practice is known, may also offer a way to increase carbon storage, both above and below ground.

Silvopasturing is just one aspect of agroforestry, which involves the broader concept of combining any crop—including pasturage—with forests. ARS's Dale Bumpers Small Farms Research Center in Booneville, Arkansas, also does silvopasture research. The center is located in a "small-farm belt" that begins in Arkansas and Missouri and works its way north, following the Appalachian Mountains from Georgia to Maine.

This center has 2,300 acres of land devoted to research on integrated farming systems. Like other ARS locations involved in natural-resource research, the center is oriented toward a mix of basic and applied research aimed at removing obstacles to successful sustainable farming.

And, as at all our labs, Booneville researchers cooperate with others, such as the University of Missouri's Center for Agroforestry and the Community Development Center in Shirley, Arkansas.

In Watkinsville, Georgia, ARS scientists work on helping farmers increase crop yields despite the marginal soils that plague large portions of the Southeast, East, and Midwest. They're also working with labs such as the one at Beaver to breed better tall fescue plants and to fertilize them in ways that do not contaminate streams or groundwater.

Perhaps equally dramatic a landscape—but on the other end of the climate scale from humid West Virginia—is the 193,000-acre ARS Jornada Experimental Range in the Chihuahuan Desert at Las Cruces, New Mexico. Researchers there face the challenge of restoring rangeland that reverted to mostly desert during the days of the Old West. They've developed the principle of gently nudging parts of that undeveloped ecosystem to get the restoration done naturally—at the least cost to ranchers and the environment.

Moving back east, to the more conventional regions of U.S. farming—the midwestern corn-soybean ecosystems—we have the ARS National Soil Tilth Laboratory at Ames, Iowa. Its researchers seek to improve soil structure to enable it to support higher yielding crops while serving as a carbon storage reservoir and a natural buffer to cleanse soil water before it reaches streams or groundwater.

Moving northwest, we find parts of North Dakota where the land is so dry that farmers have had to leave land unplanted for a year or more to store up enough water to grow the next crop. Scientists there have devised a dynamic farming systems approach that allows farmers to grow crops just about every year, choosing from more than a dozen with varying moisture needs and also allowing for livestock in the mix.

Whether in the humid East, the arid West, or the Midwest in between, the scientists at all of ARS's natural-resource research locations follow the basic principle of helping farmers and ranchers survive by diversifying, using Nature as a guide.

All recognize the need to develop innovative farming models appropriate for the widely differing natural ecosystems that underpin American agriculture. This approach will best ensure economic, ecological, and social stability in our food and farming system. In U.S. agriculture, one size or farming style definitely does not fit all. By taking an ecological approach, ARS research improves both productivity and environmental quality.

Michael D. Jawson, Evert Byington, Dale Bucks, Mark Weltz, and **Robert Wright**
ARS National Program Leaders
Natural Resources and Sustainable Agricultural Systems
Beltsville, Maryland