

FORUM

Down the Yellowstone, the Milk, the White and Cheyenne;

The Cannonball, the Musselshell, the James and the Sioux;

Down the Judith, the Grand, the Osage, and the Platte,

The Skunk, the Salt, the Black, and Minnesota;

The Allegheny, the Monongahela, Kanawha, and Muskingum;

Down the Miami, the Wabash, the Licking, and the Green,

The Cumberland, the Kentucky, and the Tennessee;

Down the Ouachita, the Wichita, the Red, and Yazoo—

Down the Missouri, three thousand miles from the Rockies;

Down the Ohio, a thousand miles from the Alleghenies;

Down the Arkansas, fifteen hundred miles from the Great Divide;

Down the Red, a thousand miles from Texas;

Down the great Valley, twenty-five hundred miles from Minnesota,

Carrying every rivulet and brook, creek and rill,

Carrying all the rivers that run down two-thirds of the continent—

The Mississippi runs to the Gulf.

—from Virgil Thomson's 1937 score for Pare Lorentz' New Deal-era film documentary "The River"

Teaming Up for Better Water Quality

How is USDA's water quality program like the Mississippi River?

It, too, involves many rivers—not quite all the rivers carried by the Mississippi to the Gulf, but some major tributaries like the Platte, the Des Moines, the Red, and the Missouri.

And the program includes almost all the states bordering the river, from its start as a meandering creek in northern Minnesota to its end at the Gulf of Mexico—2,500 miles later.

Begin in 1990, the Management Systems Evaluation Areas (MSEA) was an unprecedented water quality effort led by two USDA agencies—the Agricultural Research Service and the Cooperative State Research Service (now the Cooperative State Research, Education, and Extension Service, CSREES)—and universities.

Until 1996, MSEA was a Midwest program. But then it was partnered with CSREES' Agricultural Systems for Environmental Quality. This broadened MSEA's scope, bringing in Ohio's Lake Erie Basin, the Mississippi Delta region, and the eastern Coastal Plain.

Both the delta and Coastal Plain areas are experiencing problems with algal blooms. In the Gulf, a growing hypoxic—oxygen-starved—dead zone is killing shellfish. Along the eastern Coastal Plain, problems with fish-killing

Pfiesteria and red tide have been recurring.

Nitrogen and phosphorus are possible causes of these blooms. Nitrate-nitrogen is a byproduct of nitrogen fertilizer used on nearly all cropland, as well as on lawns and other areas. Phosphorus and nitrogen reaching waterways also come from nonfertilizer sources, such as waste treatment plants.

Reducing nitrogen loadings into the Mississippi by 20 percent could increase oxygen levels in the Gulf, according to the National Science and Technology Council's Integrated Assessment Reports.

In many places, our research through MSEA has shown how farmers can reduce these loadings to safe levels in surface water and groundwater. As a result, MSEA has brought new technology to the forefront. For example, portable chlorophyll meters can now detect nitrogen levels in plant leaves. TDR (time-domain reflectometry) electronic probes can monitor soil moisture.

MSEA has packaged new and not-so-new techniques into workable systems, such as growing corn and soybeans on raised seedbeds. The ridge tillage system was tested at all the Midwest MSEA sites—Iowa, Kansas, Minnesota, Missouri, Nebraska, the Dakotas, Ohio, and Wisconsin. It reduced herbicide and nitrate losses.

In fact, the most pleasant surprise from the Midwest program has been a virtual absence of herbicides in groundwater.

Popular herbicides like atrazine and alachlor just didn't show up at the levels expected.

We must continue to evaluate the extent to which the newer pesticides—along with other compounds, such as hormones and antibiotics—can be carried away in runoff from farms and watersheds to pose environmental or health risks. We must also continue to study toxic organisms in runoff, such as *Cryptosporidium*, which can occur in human and animal wastes.

The good news has to be balanced against Missouri's experience with very high levels of pesticides in farm runoff. This was caused by local soil conditions, but those conditions are representative of 7 million acres of midwestern cropland with potential for similar problems.

USDA is determined to give farmers as many tools as possible to help them greatly reduce their share of the water quality problem. A good example is in Iowa, where farmers voluntarily adopted practices when they saw they could get the same or better corn yield with 50 pounds less nitrogen fertilizer per acre.

It's not just in Iowa, however, that farmers are adopting practices to control runoff and protect groundwater. The Midwest program has taught us that if some adopt new practices, others will follow—and that's exactly what is happening in many areas.

Dale Bucks

ARS National Program Leader for Water Quality and Management