URBANA, Ill. — The Midwest, blessed with rich soils and abundant precipitation, leads the country and the world in corn and soybean production. It also contributes the majority of the nitrate load in the Gulf of Mexico, leading to its large low-oxygen “dead zone.” Nitrate applied to farm fields also winds up in local drinking water supplies, which must be removed at a major cost to municipalities. Fortunately, there are ways for farmers to reduce nitrogen loss, and a new University of Illinois Extension booklet provides details on 10 suggested practices.

“In this booklet, we present a consistent source of information about a variety of practices that can reduce nitrate in drainage water,” says University of Illinois assistant professor of water quality Laura Christianson.

The 10 practices described in the booklet are broken down into three categories: reducing nitrate in the plant root zone, reducing delivery of nitrate to the field’s edge, and removing nitrate at the edge of the field or downstream.

“We wanted to present a variety of options that are practical for farmers, and provide some comparison between the practices. Where does each practice work? How much will it cost? How well does the practice work? People can get a good idea of what’s going to work for them,” Christianson says.

To reduce nitrate in the plant root zone, farmers can improve nitrogen management, plant winter cover crops, or increase their use of perennials. These practices minimize the amount of nitrogen that enters drainage tile pipes in the first place.

Christianson explains that many farmers in Illinois are already applying nitrogen fertilizers at the university recommended rate. “For them to reduce their rate wouldn’t make any sense and wouldn’t provide water quality benefits. The timing of nitrogen application and use of nitrification inhibitors are probably the management changes I’d focus on more rather than rate, as long as you’re following university guidelines,” she says.

Farmers might instead choose to change the physical drainage system in their fields. The practices recommended in the booklet include adding controlled drainage structures to keep drainage water in the soil; recycling drainage water; and reducing drainage intensity by increasing spacing between drains and decreasing drain depth.

“The new practice of drainage water recycling is especially exciting because there is a significant potential to increase crop yields by storing drainage water and reapplying it when it’s needed by the crop. This practice doesn’t come cheaply, but could be good for yields and downstream waters,” Christianson notes.

The final category consists of edge-of-field practices including adding bioreactors or constructed wetlands, converting drainage ditches to two-stage ditches, or using saturated buffers. Christianson is a vocal advocate of bioreactors, and admits that this practice is her personal favorite. But she knows other practices might hold more appeal.

“The important thing is just trying something new—getting a new practice on the landscape to improve water quality. A bioreactor might not work for someone, but they might want to do a cover crop and that’s great,” Christianson says. “In fact, cover crops might have the biggest chance of adoption. And if everyone started planting cover crops, especially grass-based cover

crops that overwinter like cereal rye, that would be our best chance of having a positive water quality impact.

“Really, the best practice is the one that works for each individual farmer. That’s why providing a list of options and being able to compare them is important,” Christianson says.

Each practice comes with a detailed description explaining what it is, how it improves water quality, how effective it is, where it will work, whether it has any additional benefits, and its level of acceptance. The booklet also contains a chapter on economic considerations of each strategy. An online course for certified crop advisors is being developed to accompany the booklet, with a likely launch near the end of spring 2017.
The booklet, “Ten ways to reduce nitrogen loads from drained cropland in the Midwest,” is co-authored by Extension faculty from Purdue University, South Dakota State University, Iowa State University, and the University of Minnesota, and collaborators at the Iowa Soybean Association. It is currently available as a free download at Christianson’s website, or printed copies can be purchased for a nominal fee at PubsPlus.

— Lauren Quinn, University of Illinois