Drainage: management options to mitigate nutrient export

Within the prairies we're used to dryness. Yet, in key periods, there is a lot of water, which can move quickly. We manage our agricultural landscapes to help manage this water – adopting reduced tillage to help manage soil quality, and maintain soil moisture, and using drainage to move water away from where we don't want it.

Recent wet conditions in the prairies have reminded us of the challenges of water management and of drainage. While this decades-old practice is part of prairie agriculture, it has a myriad of benefits, and negative impacts. One of the negative impacts is the potential impact on water quality.

By draining prairie lands, we can increase nutrient loads to downstream ecosystems – by connecting areas of the watershed that typically wouldn't lead to flow, by removing wetlands, which can function as nutrient sinks, by reducing the capacity of the landscape to store water, and in some areas, and by contributing to erosion, as more water may leave more quickly, taking soils along.

Can we manage ditches to help manage water quality? Research is underway:

Vegetation residues can be an important source of nutrients on prairie agricultural fields. This is because vegetation residues can release nutrients when they are frozen and thawed during long, cold winters. In our work, we're experimenting with managing the vegetation in ditches, to see if removing vegetation is enough to impact nutrient loads downstream. We're also assessing the sediments of ditches to better understand if they will function as sources of nutrients, or if they could indeed help trap nutrients.

To do this, we're combining small scale experiments with larger scale monitoring. We're sampling for nitrogen and phosphorus in water, and monitoring how much water and nutrients move through ditches. Then, we're looking at what happens to nutrient export when we hold water back in ditches – a common practice to help manage floodwaters. We want to know if holding this water back will have added benefits in terms of water quality of downstream lakes and rivers.

This work is just one area of research we're engaged in to help manage water quality in our agricultural landscapes. We're looking for options that work, in our working landscape – and can help maintain strong agricultural production, while protecting water quality.

What else can we do to mitigate effects of drainage on water quality?

In wet periods, the impacts of drainage on nutrient export can be very large -- potentially more than doubling nutrient loads to downstream ecosystems, and contributing to problems of harmful algal blooms. Managing this impact in our landscape is challenging. The most important advice is managing inputs.