

Heartland Co-op Conservation Drainage Program

BIOREACTORS AND SATURATED BUFFERS for improved water quality

Adding a saturated buffer or woodchip bioreactor to your land are two of the best — and most economical — ways to manage nitrates and drastically improve water quality.

BENEFITS OF A BIOREACTOR

- Nitrates are removed through denitrification and plant uptake
- Bioreactors are placed at edge-of-field
- Does not impact current land management practices



A bioreactor installation. Wood chips form the filter in the system.

For more information, or to get started, contact the Heartland Co-op Conservation Team:

Ruth McCabe
Conservation Manager, CCA, CPAg
515-418-8358
rmccabe@heartlandcoop.com

Emery Davis
Conservation Agronomist
515-250-5243
edavis@heartlandcoop.com

Nolan Grove
Conservation Agronomist
515-971-8278
ngrove@heartlandcoop.com

Courtney Strauser
Conservation Agronomist
515-218-3820
cstrauser@heartlandcoop.com

BENEFITS OF A SATURATED BUFFER

- Buffer catches sediment, phosphorus, and residual chemicals
- Provides wildlife habitat
- Nitrates are removed through denitrification and plant uptake
- Does not take much, if any, land out of production

Saturated Buffer and Bioreactor adoption incentives

- » Eligible fields have tile outlets in a nearby creek or drainage ditch
- » No out of pocket expenses for the installation of a Saturated Buffer or Bioreactor
- » \$1,000 temporary construction easement payment per outlet treated for program participation
- » We will bid out a contractor to build it — let us handle it for you!
- » Specialized drainage management structures
- » Generally non-invasive in the field— you won't even know it's there!

BIOREACTORS AND SATURATED BUFFERS: WHICH IS RIGHT FOR YOU?

Average annual nitrate reduction: **40% – 60%**

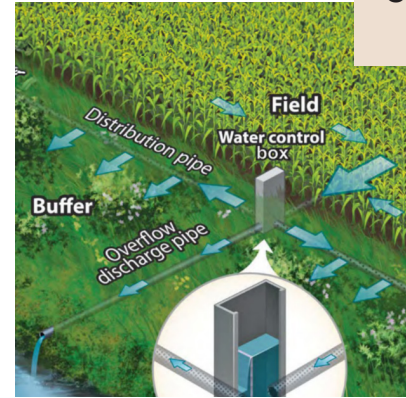
SATURATED BUFFERS

Saturated buffers are a conservation drainage practice designed to remove nitrate from agricultural tile water by modifying the outlet to allow flow to be diverted through the soil profile of a vegetated buffer. The outlet is modified by using a control structure which directs a portion of the flow to a distribution line that runs parallel to the stream.



Saturated buffer with a one-year-old prairie planting in Story County, Iowa.

NRCS/SWCS photo by Lynn Betts

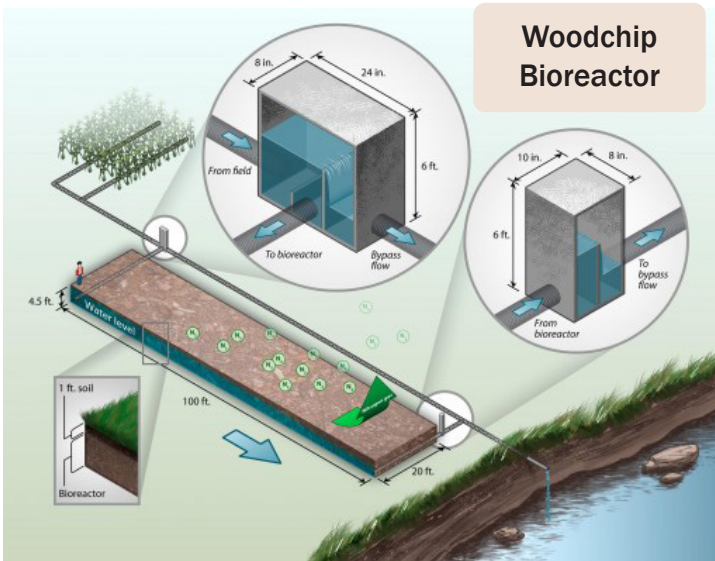


Saturated Buffer

Source: Frankenburger et al., unpublished

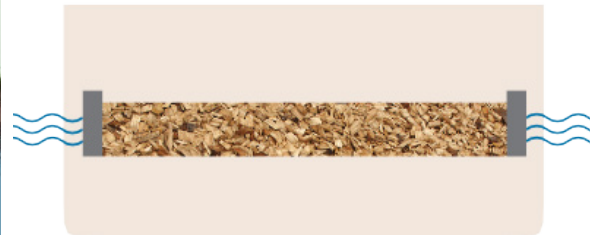
WOODCHIP BIOREACTORS

A woodchip bioreactor, also known as a denitrification bioreactor, is made by routing drainage water through a buried trench filled with woodchips. Denitrification is the conversion of nitrate (NO₃⁻) to nitrogen gas (dinitrogen, N₂) that is carried out by bacteria living in soils all over the world and also in the bioreactor. These good bacteria, called denitrifiers, use the carbon in the woodchips as their food and use the nitrate as part of their respiration process. Because these bacteria also can breathe oxygen, providing anaerobic conditions through more constantly flowing tile water helps ensure that the bacteria utilize the nitrate. Providing these denitrifiers an ample supply of carbon to eat and giving them anaerobic conditions in the bioreactor offers them a perfect environment to remove nitrate from drainage.



Woodchip Bioreactor

Drainage water is diverted through a buried trench filled with woodchips. Microorganisms convert the nitrate in the drainage water to harmless nitrogen gas (denitrification).



- Nitrate removed through denitrification
- Bioreactors placed at edge-of-field

Image by John Petersen, www.petersenart.com

This initiative is supported by the following organizations



ConservationAgronomy.com