Transforming Drainage: Retaining Water to Improve Crop Yields and Water Quality

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Crops, like people, need water to thrive

Not too much, not too little.
But in some years....

Too much (June)  Then too little (July)
Midwest farmers can manage excess water.
Subsurface “tile” drainage
Impressive drainage infrastructure for getting rid of excess water
Side Effects of Drainage: Contaminants from drainage water…

Lead to poor water quality

Photo by Tom Bridgeman
Two problems

Sometimes too much

Sometimes too little
Crop yields are often reduced due to lack of water.
How will this situation change in the future?
Sometimes too much; sometimes too little. Both intensifying as **extreme weather increases**.
In periods with too much water already, we expect more in the future

More water quality problems

More flooding

Photo: Tom Bridgeman

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In periods with too little water already, we expect drier conditions in the future.

More crop loss

More need for irrigation using potentially scarce water supplies
Solution:
Retaining more water in the landscape
The goal in agricultural drainage has been to get rid of excess water as quickly as possible.
But can we instead **retain water** in drained agricultural landscapes like this?
Storing water in the soil
Increasing soil health.

- Increasing soil organic matter can increase water holding capacity.

Image: Wikimedia Commons, Wilsonbriggs
Image: NRCS
Storing water in wider ditches: Two-Stage Ditches
Storing water in the field:
Controlled drainage

After harvest

Before planting or harvest

After planting
Storing water in ponds or reservoirs: Drainage water recycling

Store drained water in a pond and irrigate it back onto crops later in the season.
An old idea being revived and made part of the conversation
Reservoirs will need to be large.
Drainage water recycling

stores drained water in a pond
and irrigates it back onto crops later in the season

But there is a major challenge.

Storing water is expensive!
Drainage water recycling ponds in Michigan

Late 90’s – 1 acre
Road construction.

2010
Key design/research question: How big should the water storage reservoir be?
Trying various sizes of Storage Reservoir

2% of field area
4% of field area
6% of field area
8% of field area
10% of field area

Avg. Depth: 10 feet

Drainage water recycling in MI
Percent of Annual Nitrate Loss Recycled (%)
The Evaluating Drainage Water Recycling Decisions (EDWRD) tool is available at http://transformingdrainage.org/tools/EDWRD
A new 8-page publication provides a broad overview of the benefits, costs and other common questions related to drainage water recycling systems. ...

Continue Reading...
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The Vision: Transforming Drainage

Long-term vision:
The process of designing and implementing agricultural drainage will be **transformed** to include water **storage** and even water **recycling**.