AGRICULTURE

OVERVIEW,

BENEFITS OF AGRICULTURE,

CONSEQUENCES OF AGRICULTURE,

SOLUTIONS

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McHenry County's history is deeply rooted in agriculture:

- Approximately 208,339 acres of farmland in McHenry County
- Accounts for 56% of McHenry County total land area
- $163,751,000 of agricultural products from McHenry Co. were sold in 2017

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Urbanized landscapes are dominated by impervious surfaces that prevent infiltration and recharge of groundwater aquifers

Agricultural land in McHenry County can allow water to infiltrate through the soil and recharge groundwater aquifers

McHenry County relies on groundwater aquifers for all of its potable water

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Preservation of farmland and local farms are stated goals of County's 2030 Plans

- Plans recognize that open space and agriculture are almost impossible to replace
- Plans suggest most new residential growth should occur within municipalities to:
  - Protect groundwater recharge
  - Preserve rural landscape
  - Preserve environmental, recreational and agricultural values
  - Avoid drainage/flooding conflicts that arise from residential encroachment

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According to 2017 Census of Agriculture 91% of farmland in the county is cropland, most of which is used for commodity row crops

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2030 Plans state that the county should value agriculture in all forms including:

- Commodity row crops, livestock, dairy, equestrian farms
- Specialty growers and local food producers
- Direct sales, farm stands, farmers markets, agri-tourism, CSA's, Farm-to-Table
- Sustainable local food system, food distribution hub, food cooperatives

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Conventional agricultural practices include plowing and tilling soil:

- Controls weeds
- Provides temporary aeration of soil
- Breaks down organic matter for short burst of nutrients
- Prepares the ground for seeding

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Healthy Soil

Degraded Soil

Conventional agricultural practices have negative impacts:

- Fractures and degrades the soils structure
- Breaks down organic matter
- Kills living biota in soil
- Reduces soils ability to hold and infiltrate water

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Erosion, Soil loss, Flooding

Excess Nutrients and Pollution

Conventional agricultural practices have negative impacts:

- Cause erosion, soil loss, and sedimentation
- Contribute to increased flooding
- Pollute water (groundwater and surface water)
- Reduce groundwater recharge
- Release greenhouse gas emissions

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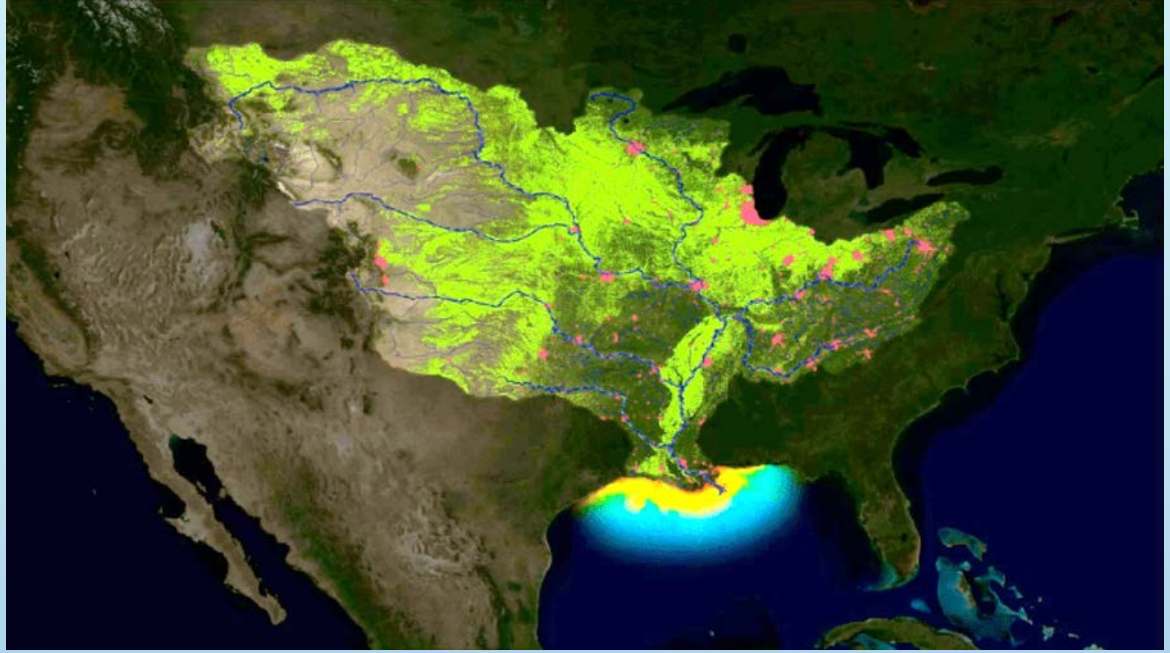
Conventional agricultural practices rely on use of fertilizers and pesticides:

- Nitrogen, phosphorus or pesticide regularly wash off of farm fields
- Pesticides are toxic to people and wildlife
- Pollutes lakes, rivers, streams, ponds and wetlands
- Leaches into groundwater
- Having impacts locally and globally



DEAD ZONE IN GULF OF MEXICO:

- Hypoxic zone can regularly cover 6,000 to 7,000 square miles
- Primarily caused by nutrient enrichment from the Mississippi River
- Most excess nutrients from farming in Mississippi River watershed
- About 67% of nitrogen from north of confluence of Ohio River

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Livestock have potential to cause water pollution:

- Animals produce large amount of manure and urine
- Animal waste rich in nutrients including nitrogen and phosphorus
- Feedlots or overgrazing can cause erosion
- Large concentrations of animals can pollute groundwater and surface water

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Many Conservation Practices (CPs) to manage excess nutrients and pollutants:

The USDA/NRCS developed a systems approach to classifying CPs:

- Avoidance CPs– Help producers avoid causing pollution
- Controlling CPs – Land treatments that help keep pollutants in place
- Trapping CPs– Last line of defense to prevent pollution from leaving site

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Avoidance Practices

Conservation Cover (327):

-Establishing perennial cover

-Not used for forage production

-Protects from soil erosion

-Provides wildlife habitat

-Usually includes native vegetation

Cover Crops (340):

-Grasses, legumes, or forbs

-Rotated between cash crop plantings

-Maintains soil cover at all times

-Protects and improves soil health

-Improves water storage/infiltration

-Suppresses weeds

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Avoidance Practices

Livestock or Streambank Fencing (382):

-Fencing or barriers

-Prevent access to sensitive areas

-Protects from shoreline erosion

-Keep nutrients/pollutants out of water

-Should provide buffer or filter strip

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Avoidance Practices

Nutrient Management (590):

-Manage placement of fertilizers, manure or other soil amendments following (Four R's)

Right fertilizer – to match crop needs

Right rate – to match crop needs

Right time – match nutrients when needed

Right place – keep nutrients where needed

Integrated Pest Management (IPM):

-Ecosystem-based approach

-Understand pests habitats, lifecycle, needs

-Use least toxic methods first

-Only pesticides if need verified by guidelines

-Set threshold of economic harm to trigger action

-Tolerate harmless pests

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Controlling Practices

Tillage Methods

Conventional Till

Bare Soil Unprotected from Rain

No Till

Crop Residue Protects Soil from Rain

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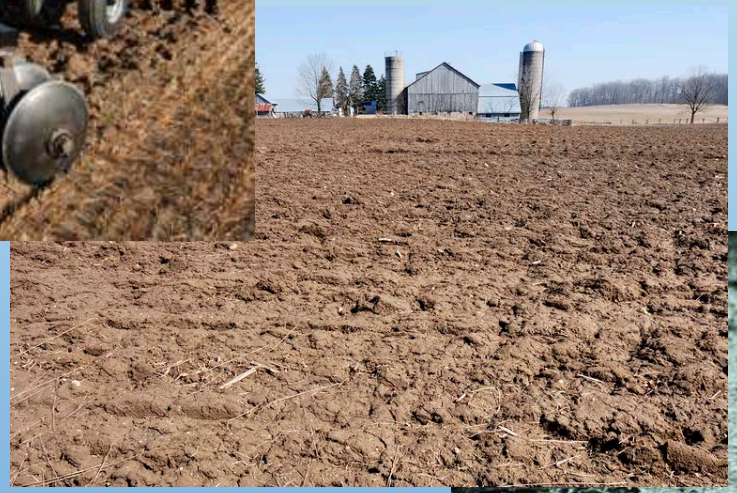
Conventional Tillage Methods



- Breaks Up Soil
- Clogs Soil Pores
- Reduces Infiltration
- Increases Runoff
- Causes Erosion

- Damages Soil Structure
- Kills Soil Organisms
- Reduces Water Storage

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No Till Methods

- Protects Soil
- Builds Organic Matter
- Increases Infiltration
- Reduces Runoff

- Improves Soil Structure
- Enhances Soil Organisms
- Increases Water Storage

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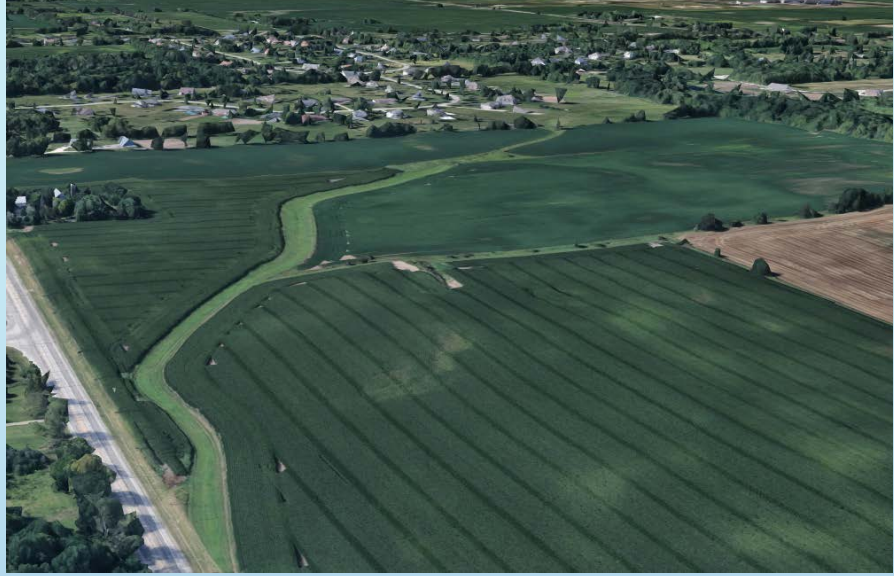
Controlling Practices



Drainage Water Management (554):

-Control release rate of drain tile

-Adjust water elevation in drain tiles

-Reduce nitrogen levels released

-Promote infiltration

-Water available when needed

Grassed Waterways (412):

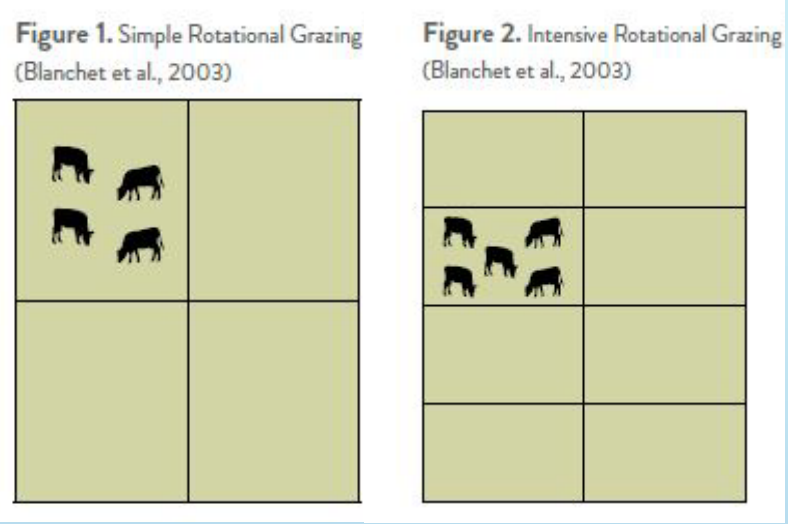
-Vegetated channel

-Convey water non-erosive velocity

-Prevents erosion

-Improves water quality

-Can provide wildlife habitat



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Controlling Practices

Rotational Grazing (528):

-AKA Prescribed or Controlled Grazing

-Alternate foraging paddocks

-Time to maintain vegetation health/cover

-Reduce erosion, improve water quality

-Can be simple or intensive “mob” grazing

Clean Water Diversion-Feedlots:

-Animal concentrations-small area

-Large amount of manure & urine

-Divert clean water to avoid contact

-Rooftop water, non-polluted runoff

-Elevated berms or grassed swales

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Trapping Practices

Filter Strips (393) and Grassed Riparian Buffers (390):

-Borders of grass/permanent vegetation

-Between farmfield & sensitive resources

-Reduce velocity of runoff

-Prevent erosion

-Allow pollutants to settle out

-Improve water quality

-Filter strip anywhere/Riparian buffers along water

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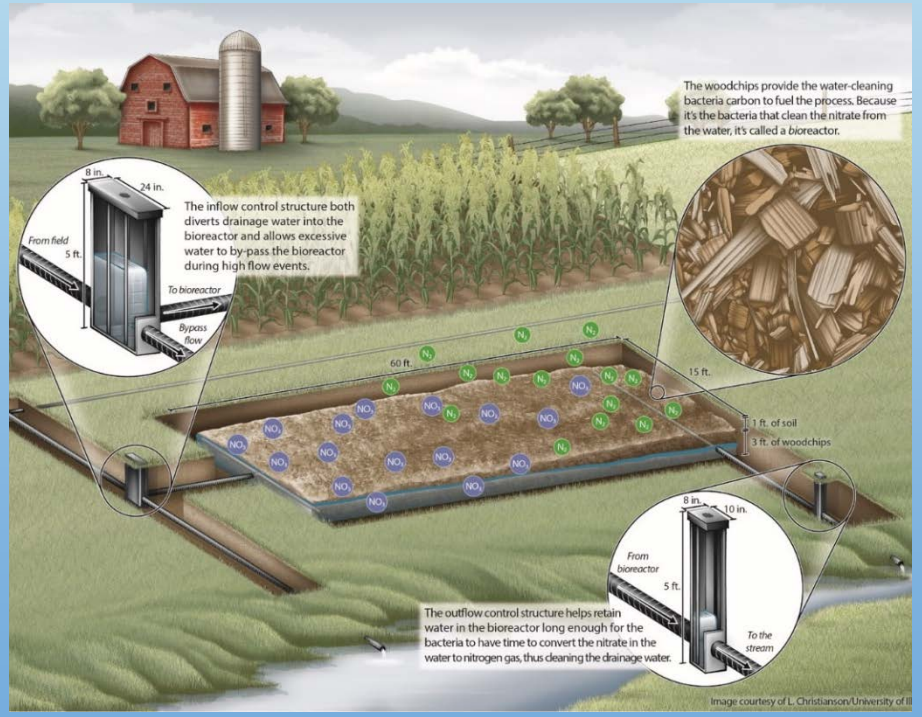
Trapping Practices

Dentrifying Woodchip Bioreactor (605):

-Reduces nitrogen/tile drainage

-Excavation and woodchips

-Direct tile runoff through bioreactor



-Low maintenance

-Install/remove boards for water levels

-approx. 15-20 year lifespan

-Replace woodchips

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Trapping Practices

Constructed (Treatment) Wetland (656)

-Man-made ecosystems in areas that do not have existing wetland

-Replicate water-cleansing process of natural wetlands

-Designed to maintain wetland hydrology

-Planted with native wetland vegetation

-Filter wastewater and contaminated runoff from sub-surface drainage from cropland, feedlots, aquaculture operations, and agricultural processing facilities

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Trapping Practices

Wetland Creation (658)
And
Wetland Restoration (657)

Creation (658): To establish wetland hydrology, vegetation, and wildlife habitat functions

Restoration (657): To return wetland to approximate conditions that existed prior to disturbance

-To establish wetland hydrology, vegetation, and wildlife habitat functions

-Planted with native wetland vegetation appropriate for habitat and goals

-Replicate or restore water storage and cleansing process of natural wetlands

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"The nation that destroys its soil destroys itself"

Franklin D. Roosevelt

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Recommendation

McHenry County farmers, along with the agencies and organizations that support them, should take a leadership role in adopting no till, cover crops, and other conservation practices that ***restore soil health*** *in order to protect water resources, make farms in the county more resilient to extreme weather, and improve profitability.*

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Build Soil Health

Five Principles for Soil Health

1. Minimize Soil Disturbance

Physical disturbance – Such as conventional tillage

-Kills soil organisms, damages soil structure, leaves soils unprotected, causes erosion

Chemical disturbance – Such as over application of nutrients and pesticides

-Disrupts food web between fungi, other microorganisms, and plant roots

Biological disturbance – Such as over-grazing

-Reduces root mass, increases runoff/erosion, limits ability to harvest CO2 and sunlight

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Build Soil Health

Five Principles for Soil Health

2. Increase Plant Diversity

- Plant diversity produces numerous carbohydrates to support a diversity of beneficial soil organisms

- Diversity of soil organisms help provide nutrients and water to plants and fend off disease/pests

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Build Soil Health

Five Principles for Soil Health

3. Maintain Continuous Roots and Living Plants in the Soil

- Living plants maintain a rhizosphere, an area of concentrated microbial activity close to the root
- Since living roots provide the easiest source of food for soil microbes, maintaining rooted vegetation all year, provides continuous food resources to build soil health
- Continuous root structure helps to prevent erosion and keep soil in place

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Build Soil Health

Five Principles for Soil Health

4. Keep soil covered to maintain soil armor

Soil cover:

- intercepts rain and protects soil from erosion,
- Conserves moisture,
- Warms soil in winter/cools soil in summer,
- Suppresses weed growth,
- And provides habitat for members of the soil food web

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Build Soil Health

Five Principles for Soil Health

5. Carefully Timed Livestock Integration ***

- Animals, plants and soils have maintained a synergistic relationship over geologic time
- Integrated crop-livestock operations can result in many soil health benefits
- Livestock manure adds organic matter to the soil
- Livestock can be included by allowing them to graze cover crops or using rotational grazing

*** Not all information sources include Livestock Integration as a Principle of Soil Health

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Build Soil Health

No-Till

Cover Crops

Properly implementing these principles should include the use of No-Till and Cover Crops

- No-till practices and cover crops each provide many benefits on their own, but adopting both can support the successful transition from conventional-till to no-till.

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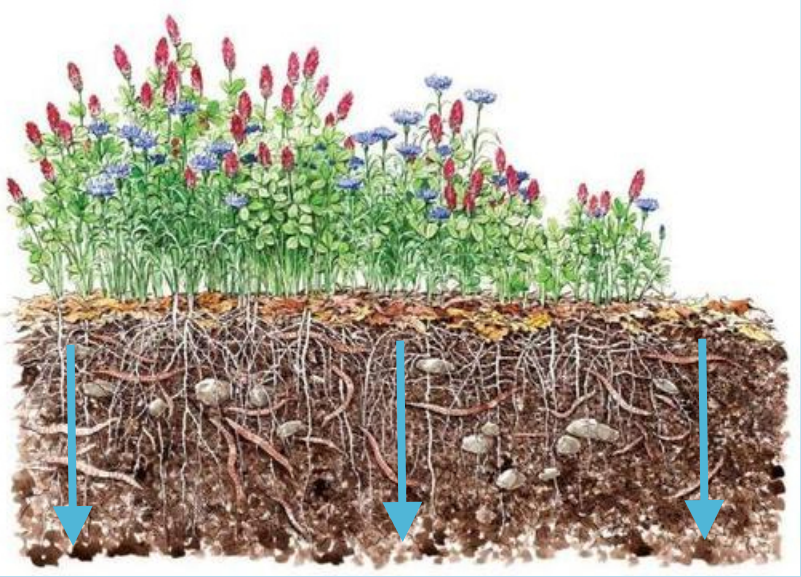
Build Soil Health

Cover Crops

Cover crop mix with sunflowers

Cover crop, soil, and roots

- Cover crops are specific plant species grown primarily for the benefit of the soil health rather than to provide a crop yield
- Maintain live roots and vegetative cover between rotations of cash crops
- Biomass below/above ground provide sources of nutrients and carbon to feed microbes and other soil organisms which in turn build organic matter in the soil
- Increasing organic matter and soil food web organisms help create healthy soil



Cover crops, roots, soil-food web, healthy soil, infiltration

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Build Soil Health

Cover Crops

Cover crops and roots

Healthy soils and cover crops provide many benefits for water resources and the farmer

Benefits of Cover Crops	
Improved capacity to store/infiltrate water	Protect water quality
Reduced runoff and erosion	Improve crop yields
Protect farms from flood and drought	Helps safeguard personal health
Provides nutrients without added fertilizer	Saves time (less till, fertilizer, herbicide)
Suppresses weeds without added herbicide	Saves money (less fuel, fertilizer, herbicide)

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Build Soil Health

Cover Crops

Legumes

Grasses

Buckwheat

Cover Crop Cocktail Mix
- Enhance Species Diversity -

Forage Radish

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Build Soil Health

Cover Crops

Planting Soybean into young cover crop (cereal rye)

Seeding into cover crops

Planting cover crops into corn with high seeder

Plane aerial seeding cover crops

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Build Soil Health

Terminating Cover Crops

Laying down cover crops with roller-crimper

"Green Manure"

Terminating with Herbicide
"Burn Down"

Prescribed Grazing with Livestock

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Build Soil Health

Cover Crops

Provide Habitat for Pollinators and Wildlife

Monarch Butterfly on Buckwheat

Bee at Crimson Clover

Meadowlark, Grassland Bird

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As Leaders Building Soil Health with No-Till and Cover Crops, farms in McHenry County can:

- Improve soils ability to hold and infiltrate water
- Recharge groundwater aquifers
- Help to reduce flooding and erosion
- Reduce excess nutrients and pesticides in runoff
- Be more resilient to increased precipitation, storm intensity, temperatures and drought
- Provide healthy soils for future generations of farmers in McHenry County

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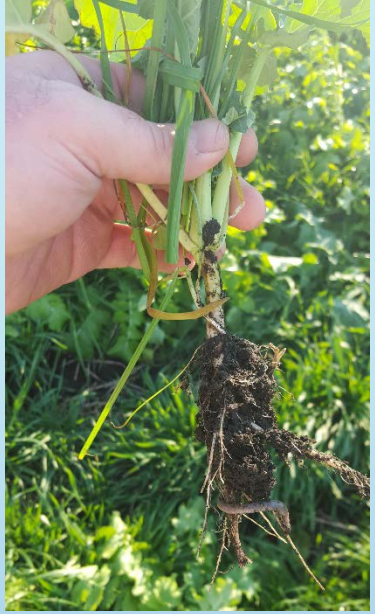
Recommendation



The County, Natural Resource Conservation Service, Soil and Water Conservation District, Farm Bureau, McHenry County College, other organizations should coordinate to provide training, education, or other support to help farmers implement no-till, cover crop, and other conservation practices that protect water resources.

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Recommendation

Residents, businesses, and institutions in McHenry County should support farms that produce food locally and sustainably to protect water resources, enhance food security, and maintain the county's agricultural heritage.

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Recommendation

The County, municipalities, businesses, organizations and institutions should promote agritourism and ecotourism by highlighting its local food and sustainable farms, the scenic vistas and rural charm, and vast natural areas, to market McHenry County as a healthy destination for visitors to play, eat and explore.