Steps for Restoring Healthy Ecosystem Function to Control Dead Zones

AGRICULTURE

Cover Crops

Cover crops are various crops grown between the harvesting of the current year's row crops, like corn or soybeans, and the planting of the following year's row crops. Bare soil is prone to erosion. Cover crops help to shelter soil with their leaves and hold it in place with their roots. Reduced erosion leads to a slowing of phosphorus loss. Cover crops also reduce nitrogen loss through plant uptake. Legume species, like red clover, used as cover crops can acquire atmospheric nitrogen, by working with soil bacteria, and release it into the soil for use by subsequent crops.

Minimal Tillage and No-Till

Tilling is the turning over of the top 6 to 10 inches of soil before planting new crops. It helps to work any surface crop residues, fertilizers, and weeds into the soil while also aerating and warming it. However, tilling displaces or kills soil microbes and necessary insects, and tilled soil is prone to erosion. No-till practices keep the soil intact by leaving crop residue on the surface of the soil, allowing the soil to better absorb and be infiltrated by water and nutrients without washing away. No-till maintains soil organisms, allowing for heathier soil biodiversity, and can reduce the need for chemical fertilizers. Minimal-till is a reduction of conventional tilling practices, such as changing from twice yearly to once yearly, tilling concurrently with seed placement or to turn under weeds, or shifting from a full-field till to strip till, where tillage is confined to a narrow area where the next crop will be planted.

Crop Rotation

Growing different types of crops over several years in the same growing area is crop rotation. Types of crops good for crop rotation include both vegetable or forage plants, as well as types of legumes, grasses, or grains. Rotation reduces issues with insect pests and disease, reduces soil erosion, improves soil health, and increases soil fertility. Increased soil fertility means a reduction in the amount of chemical fertilizers required.

Fertilizer Management

Depending on location, weather/climate, types of soil, and crop needs, there are a variety of requirements for fertilizer application. Farmers can test their soils to determine their soil's health and learn what nutrients are lacking. By using the correct type and amount of fertilizer needed, as well as basing when they fertilize on both the crop and the weather, farmers can help ensure more nutrients are absorbed by the plants and fewer are lost to either the atmosphere, as happens with nitrogen as soils warm, or erosion, as happens with phosphate.

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LANDSCAPE

Stream or Conservation Buffers

Buffers are areas of grassy or native vegetation adjacent to streams that slow water runoff and trap sediment, nutrients, and pollutants from farm fields. Buffers also stabilize stream banks, reduce water temperature, and provide wildlife habitat.

Water and Sediment Control Basins (WASCOBs)

Water and sediment control basins are collection basins built at the lower end of slopes in areas with irregular, sloping land. The basins help trap sediment and control runoff. They can improve downstream water quality and improve the farmability of sloping land. Often the basin-trapped sediment can be excavated and returned to the fields. Nutrients like phosphorus, which are carried in sediment, enter the waterways in reduced amounts.

Wetlands

Wetlands are areas that have saturated or nearly saturated soils most of the year. These can include inland wetlands or coastal wetlands, such as marshes and mangroves. In the 1700s, wetlands were regarded as swampy areas that bred disease and were generally problematic or not useful. By the mid-1980s, the US had less than half of the wetlands that existed in the early 1600s. In the Midwest and elsewhere, many wetlands were drained and converted to agricultural production. Restoration of former wetlands and preservation of existing wetlands help to provide many benefits for water quality. Wetlands help filter the water, lowering levels of pesticides, sediments, and nutrients like phosphorous and nitrogen continuing through a watershed; control flooding; and provide wildlife habitat.

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OTHER

Reducing Wastewater Treatment Plant and Industry Emissions

Wastewater is storm runoff and sewage from homes and industry. Industrial sewage is water remaining from manufacturing or chemical processing. After treatment, which varies depending on type and local standards, wastewater is typically dispersed into a local waterway. Older storm runoff systems were often built to flush directly into sewer systems, meaning during heavy storms, sewage may overflow into waterways. Newer systems typically carry stormwater directly to a stream or river along with any pollutants washed from roads or municipalities. Human waste, soaps, and detergents deposit nitrogen and phosphorous into sewage. Depending on equipment and the age of treatment systems, the amount of these nutrients dispersed with the treated water varies.

Curbing Fossil Fuel Use

Burning fossil fuels releases nitrogen compounds into the air, which contribute to smog and acid rain. When nitrogen returns to the land and water, it contributes to nutrient pollution.

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SOURCES & MORE INFORMATION

Cover Crops

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ny/technical/?cid=nrcs144p2_027252

Minimal Tillage and No-Till

https://www.iowaagwateralliance.com/conservation-solutions/no-till-strip-till

Crop Rotation

https://www.sare.org/Learning-Center/Books/Building-Soils-for-Better-Crops-3rd-Edition/Text-Version/Crop-Rotations

Fertilizer Management

https://www.ers.usda.gov/topics/farm-practices-management/crop-livestock-practices/nutrient-management/

Stream or Conservation Buffers

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_023568

Water and Sediment Control Basins (WASCOBs)

https://efotg.sc.egov.usda.gov/references/public/PA/WaterandSedimentControlBasin638JobSheet.pdf

Wetlands

https://oceanservice.noaa.gov/facts/wetland.html

Reducing Wastewater Treatment Plant and Industry Emissions

https://www.epa.gov/nutrientpollution/sources-and-solutions-wastewater

Curbing Fossil Fuel Use

https://www.epa.gov/nutrientpollution/sources-and-solutions-fossil-fuels