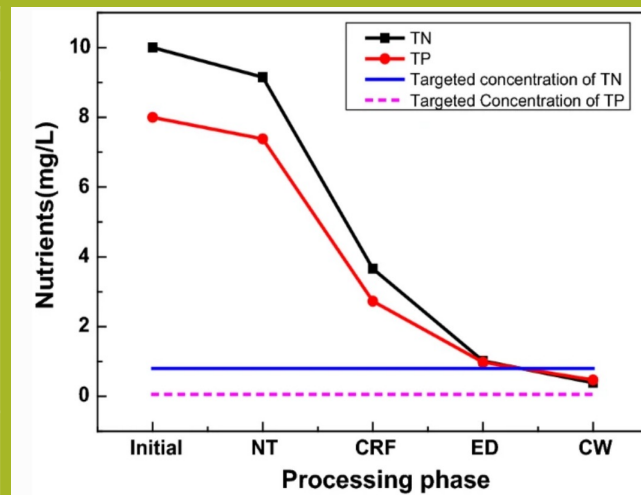


EROSION AND RUNOFF: CONVENTIONAL AGRICULTURE'S IMPACTS

Conventional agriculture practices including heavy application of chemical fertilizers and tilling degrade the soil, leading to soil erosion and nutrient-rich runoff into nearby bodies of water. This has broad impacts on the environment, public health, and the economy.

The impact:

Environmental	Social	Economic
<p>46% of rivers and streams have nutrient excess, and 28% are assessed as "healthy" based on their biological communities</p>	<p>Nitrates are too high in 64% of shallow monitoring wells for usable water in agricultural and urban areas</p>	<p>Nitrate-removal systems in Minnesota caused supply costs to rise from 5-10 cents per 1000 gallons to over \$4 per 1000 gallons</p>
<p>Over 166 dead zones have been documented nationwide, affecting waterbodies like the Chesapeake Bay and Gulf of Mexico</p>	<p>Polluted water from runoff led to the closing of a drinking water plant in China and a crisis affecting millions of people</p>	<p>The tourism industry loses about \$1 billion each year due to water bodies affected by nutrient pollution</p>



Scenario analysis of integrated treatment of agricultural runoff [46, 65, 85, 106] (NT: no-tillage; CRF: controlled-release fertilizer; ED: ecological ditch; CW: constructed wetland)

In order to show the impacts of different techniques' effectiveness at reducing phosphorus and nitrogen, Xia et al, 2020 created a scenario analysis for a hypothetical rice paddy using multiple data sources. The initial amount of nitrogen and phosphorus in the soil was set at 10 mgN/L and 8 mgP/L. The analysis aimed to reduce nitrogen by 92% and phosphorus by 98%, shown as the dotted and blue lines in the graph.

The solution:

Conservation agricultural practices use techniques designed to minimize soil disturbance, keep the soil permanently covered and prevent erosion while buffer strips and wetlands can prevent nutrients from reaching water bodies. These practices have widespread positive impacts on social and economic spheres.

Environmental	Social	Economic
<p>Conservation tillage, cover crops, and water saving irrigation practices reduce erosion from agricultural lands</p>	<p>Increased drinking water quality</p>	<p>Topsoil retention reduces use of expensive fertilizers. In USA in 2015, 77.46 kg/ha/year of Nitrogen fertilizer and 28.82 kg/ha/year of Phosphorous fertilizer were applied</p>
<p>Fertilization management, buffer strips and wetlands reduce amounts of nitrogen + phosphorous in waterbodies</p>	<p>No till practices decrease labor demands</p>	<p>In USA, no till systems with lower fixed and variable costs, and lower soil erosion had savings of 90.3 to 288.8 million USD (FAO 2014)</p>

Next steps:

Be aware of what you buy. Try to avoid products grown using conventional agricultural practices

Farmers and ranchers can contact the Environmental Quality Incentives Program (EQIP) to get financial, educational, and technical assistance

Want erosion data specific to your area? Contact your local agricultural extension service or USDA National Resource Conservation Service (NRCS)