



Where Soil and Water Meet

April 2014 Snapshots

The past few years have seen a renewed interest in Soil Health from Federal, State and local conservation partners as well as a growing number of agricultural producers. The concept of Soil Health is not completely new, but renews and builds upon the soil conservation movement of the 1980s. The novel element to the current campaign is the word *health*; the concept that the soil is a living, dynamic resource full of life. Soil Health practices such as cover cropping, reduced tillage or no-till, and crop rotation, not only improve soil tilth, productivity, and reduce erosion, but also provide an array of benefits that are rooted in improving soil biology and increasing soil organic matter.

Organic matter is a critical component of a healthy soil. Soil organic matter provides the following benefits: stabilizes and holds soil together; supplies, stores and retains essential nutrients; reduces compaction; increases available water holding capacity; increases infiltration rates; reduces water runoff; and provides a carbon source for soil bacteria, and other living organisms in soil. Here are some numbers to help put the benefits into perspective:

- Each pound of soil organic matter can hold up to 20 pounds of water in the soil profile
- Every 1% increase in organic matter holds up to an additional 25,000 gallons of water per acre
- Every 1% increase in organic matter provides up to 30 lbs of available Nitrogen per acre

In the face of climate change and the likelihood of increased intense storm events, healthy soils help create a resilient landscape that protects against soil erosion, flooding, and increases plant-available water for crops during dry periods.

Some facts:

- Erosion can strip more than 5 tons of soil per acre per year from agricultural fields, most of that by the action of water.
- Bare saturated fields produce more runoff per unit area than a gravel road.
- Excess phosphorus adheres to soil particles and is carried into surface waters with eroded soil.



A winter rye cover crop growing in early spring, Fillmore County.



An example of gully erosion, which cover crops help prevent.

- Nitrogen is water soluble and is carried by surface runoff and subsurface drainage to streams and rivers of the state. In 2013 the *Nitrogen in Minnesota Surface Waters Study* concluded that Minnesota contributes the sixth highest (out of 12 states) N load to the Gulf of Mexico.

Water and soil meet all the time. Nearly every time it rains it falls on the soil. That is normal and natural. The unnatural part comes when the soil is left unprotected. We can expect our land to continue to erode unless we heed nature's design. Soil needs to be covered and/or able to hold rain and avoid or protect against flow concentration, or it will be stripped away by rainfall. As indicated above, healthy soil is created by the biology within it, which depends on organic matter. When given the opportunity, this biology helps produce soil that will reduce runoff, erosion, and nutrient transport; store water for dry periods; and sequester nutrients for use by crops.

Here's the bottom line: All of the things a healthy soil does are complementary to the goals of erosion reduction, nutrient management and water management for crop production including conservation drainage. That's where soil and water meet!