Healthy Soil makes Healthy Watersheds that Clean and Hold More Water

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What makes Soil Healthy?

Healthy soil is like a sponge. There are air pockets and channels all through the soil. Rain and nutrients soak in easily, and plant roots grow deep. Healthy soil can hold water to buffer against drought. It also allows water and nutrients to move downward to recharge groundwater. Depleted soil resembles a brick. Natural pockets and channels are packed down and then disappear. It's hard for roots to grow. Water and nutrients can't soak in but flow away on the surface.

Soil becomes sponge-like by combining individual soil health management practices to make a soil health management system. Combined practices minimize soil disturbance through no tillage row cropping; protecting the soil from heat, evaporation, and erosion with cover crops; keeping living roots in the ground year-round through cover cropping and planting of perennials; and intensive livestock grazing to add organic material to the soil. These practices are sometimes called regenerative agriculture.

Healthy soil makes healthy watersheds.

Could Healthy Soil Help Manage Flood Risk?

A watershed is all the land that drains to a particular water body such as a lake or stream. Flood risk managers encourage land use practices like leaving open uncultivated spaces for parks and trails next to streams and rivers because the land can absorb flood waters.

Recently, Kansas flood risk managers have wondered if improved soil health in upper parts of watersheds could help manage flood risk further down in the watershed. The Kansas Silver Jackets interagency team used modeling to answer this question: how much would changes in soil properties due to soil health management systems reduce flood risk?

How did Research Test if Healthy Soils reduce Flooding?

USACE Hydrologists worked with interagency partners to apply a watershed hydrology model, also called a rainfall-runoff model. They modeled the Soldier Creek watershed in Jackson, Nemaha, and Shawnee counties using U.S. Geological Survey historic stream gage rainfall and flood flow measurements. Then, they modeled different combinations of precipitation, soil porosity (air pockets) and soil conductivity (pathways for water flow created by the air pockets) to test how changes in any of those factors resulting from soil health management systems affected possible runoff and downstream flood peaks.

What did the Research Show?

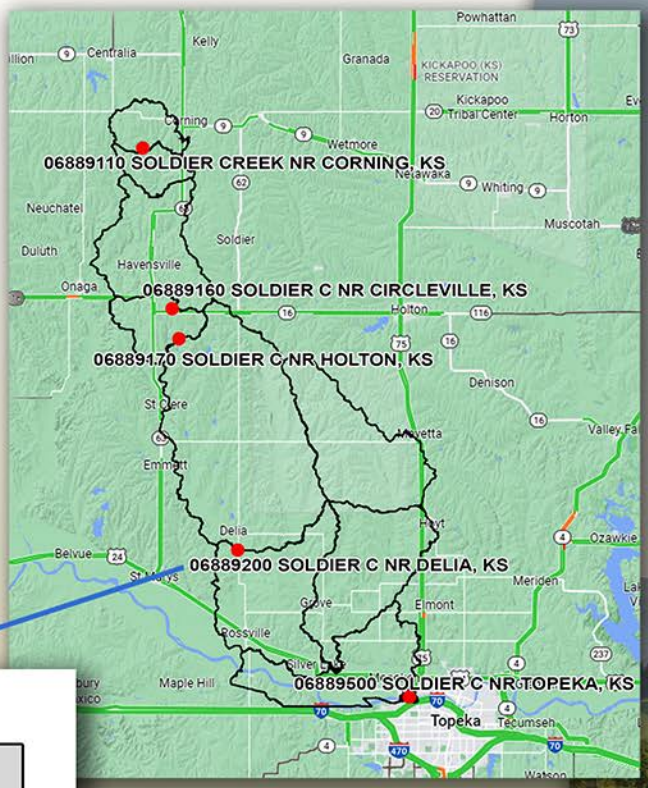
There is less runoff and lower flood peaks in a watershed where soil health management systems cause the soil to act more like a sponge. The smaller volume and lower speed of runoff water decreases the modelled likelihood of downstream flood damages.

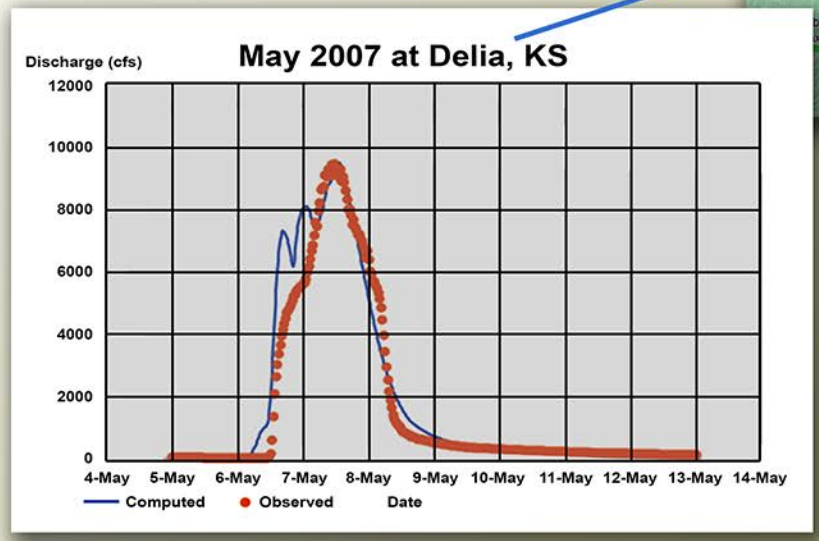
What are Other Benefits of Healthy Soil?

Healthy soil reduces erosion and sedimentation in streams and creeks because rain soaks in instead of washing away soil as the rain runs off. Healthy soil improves water quality because it acts as a filter and holds onto plant nutrients instead of running off into streams as pollutants.

Why does this matter?

Improved soil health can reduce the likelihood and amount of flood damage, especially when there is a lot of agricultural land upstream of flood prone communities. Good soil health will help flood risk management and improve water quality. Flood risk and water quality program leaders should work together to encourage soil health management efforts.





Model calibration with observed data

What can I do?

- Encourage your community to combine flood risk mitigation and water quality efforts by focusing on soil health. Leveraging resources and experiences is good stewardship of public resources. Soil health can help Kansas in its drive toward resilient communities and watersheds far more than people realize!
- If you are a producer, you may have enough land in a strategic location to make land management choices that will make a real difference in your watershed.
- Learn more about the research study, hydrology, how flood risk and water quality managers could work together, and the role of agriculture in flood risk management.

- Change your soil
- Help the watershed hold more water
- If rain water soaks in, it doesn't runoff
- Soak it in, slow it down

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