Ag quick CAST

Impacts of Soil Health Practices on Hydrologic Processes

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The adoption of management practices that promote soil health, including the use of cover crops and no-tillage or low-tillage, can have a significant impact on the hydrology of agricultural soils.

- Cover crops protect the soil surface from raindrop impact, while bare soil is susceptible to erosion. one study showed that soils under no-till management had 2.6 times more aggregate stability and 22% more soil organic carbon than conventional soils.
- Studies have shown that increasing soil organic matter (SOM) content improves both stability and infiltration rates.

Soils act as a reservoir of plant-essential nutrients and chemicals, and often the movement of those chemicals from the soil profile into the surrounding environment is a major concern.

- Nutrient and chemical transport can occur vertically through leaching or horizontally through surface or subsurface runoff.
- Soil eroded from the land surface and introduced into surface waterways is the number one pollutant of surface waters in the United States
- A recent study found 50% of tested surface waters contained levels of pesticide capable of causing negative human or aquatic species health impacts.

Climate change affects all components of the hydrological cycle and is expected to, on average, increases evapotranspiration, precipitation intensity and variability, and surface runoff while simultaneously decreasing soil water storage and groundwater recharge.

- A small increase in SOM content can enhance the soil's water storage capacity and minimize risks of drought while also improving the quality and quantity of food and strengthening other ecosystem services.

Historical landscape and infrastructure modifications, largely intended to improve land suitability for farming in the rural Midwestern United States, are responsible for a significant amount of erosion.

- In urban areas, soil health management can increase our nation's resilience to extreme weather events as well as provide agronomic and ecosystem benefits and should be an integral part of climate mitigation and adaptation plans.
- Improving soil health and infiltration in upstream agricultural fields can generate multiple ecosystem services on-site while also potentially reducing downstream flooding.

Estimates of the cost of poor soil health on societal well-being (including economic well-being) can vary widely.

- The cost of poor soil health on global food production has been estimated to range from $15B to $40B per year. Global estimates of the cost of soil salinization range from $12.9B to $27.3B per year in lost crop production and increased soil management costs, and estimated the overall global cost of soil degradation at $3T annually.

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