Coffee and Erosion

February 16, 2021

830-1030

Attendance: Joelle Neff, Mike Werling, Sara Day, Courtney Taylor, Andrea Bearman, Chi-hua Huang, Lindsey Bluhm, Nellie Peffley, Brooke Rudicel, Greg Lake, Marissa Renz, Stephanie Henry

Introduction and welcome by Mike Werling

* Sara Day from NRCS with Wells County, local erosion
* Chi-hua Huang from ARS lab in West Lafayette, bigger picture of erosion

**Sara Day**

* Works in Bluffton, Indiana
* Types of soil erosion
  + Concentrate Erosion: worsens greatly with intense rain events, large gulley’s can no longer be fixed.
  + Sheet and Rill Erosion: erosion of the whole surface.
* Soil types differ with the amount of erosion that occurs
* Soil physical properties
  + Loss of organic matter (erosion washes it away)
  + Aggregate stability (rain breaks up the aggregates)
  + Infiltration (crusting)
  + Water holding capacity (organic matter holds a lot of water)
* Soil Chemical Properties
  + Erosion washes away nutrients (fertilizer, nutrients from roots, organic matter, and manure)
  + These nutrients end up in places that can cause human and animal harm.
    - Highest risk of regulation from farmers.
* Soil biological properties
  + Erosion destroys microbial environment
    - Breaks up fungal hyphae
    - Washes nutrients away that microbes feed on
    - Breaks down earthworm channels and other homes
    - Block the flow oxygen and water
    - Soil biological processes make up 90% of soil function
* Practices that increase erosion risk
  + Tillage
    - Breaks up soil aggregates, reduces infiltration, breaks down organic matter and biological flues, breaks up the roots and residues that protect the surface
  + Row cropping and mono-cropping
    - Leaves soil bare
* Solutions
  + No till
  + Growing plants year-round
  + Diverse cropping/companion cropping
  + Managing for intense weather (cover crops)
  + Building up our soil biological environment
* Managing cover crops for erosion
  + Having them established when the rain and snow comes
  + Good surface protection throughout the cash crop season
  + Diversity is key for soil biological and physical properties
  + Choose species that hold and protect the soil
    - Grasses like cereal rye, wheat, annual rye grass, sorghum, sudangrass, and oats (fall)

Questions

* Cover crops are still good for small/urban farmers, even with small gardens. Use cereal rye.
* Huge opportunities for adding a small grain with crop rotation
* Cover crops sometimes encourage slugs

**Chi-hua Huang**

* Works at the National Erosion Research laboratory
* Soil loss creates lost civilization
* Dust Bowl
* Hugh Bennett
* Father of soil conservation
* Early Erosion research
* Rainfall simulation
* Early simulations involved watering cans
* 1954 Don Meyer identifies nozzle that simulates erosive storms
* USDA Rainulator (rain simulator)
* Changing Agricultural Priority
* Shift focus to environmental sustainability instead of productivity and resource base
* NSERL Research in Transition
* 50 years of erosion studies from 1950-2000
* Since 2000, research has shifted
* Watershed scale monitoring and modeling of conservation effects
* Fate and transport of nutrients and pesticides
* Soil hydrology and remote sensing
* Combined wind and water erosion model
* Soil quality assessment
* Use of byproducts for erosion control and water quality improvement
* Biogeochemical processes during short term water ponding
* Phosphorus and P removal technology
* Seepage Induced Erosion
* Perched water table causes exfiltration
* Then causes gullies to form wide and shallow summer gullies
* Subsurface hydrology effects on erosion
* Drainage condition
* Erosion by an intertill-type subsurface scour
* Sediment regime is detachment limiting due to high soil strength or low soil erodibility
* Seepage condition
* Severe riling occurred
* Sediment regime is transport limiting due to low soil strength or high erodibility
* Challenges in field scale erosion assessment
* Better accounting for sediment deposition
* Linkage between surface and subsurface hydrology in both sediment and chemical transport processes
* Technology for ephemeral gully erosion assessment
* Accounting for field boundary and drainage features
* Rapidly changing farming technology e.g., terraces become farming impediments in conservation tillage
* No one-size-fits-all solution. We need a combination of BMPs for individual situations
* Challenges in watershed scale conservation assessment
* Implementing and maintaining BMPs
* Establishing data layers, especially in cropping management and conservation practices
* Watershed response: baseline vs. change
* Mixing of surface and subsurface drainage water
* Identifying pollutant source and pathway: field vs. in-stream
* Quantifying in-stream sediment and chemical loading processes
* Transient response is now more important than long-term average response (driven by climate change and variability)
* Surface and subsurface water shapes the landscape
* Surface hydrology control
* Hillslope erosion
* Summer gullies
* Flash floods
* Sediment transport
* Subsurface hydrology control
* Channel initiation
* Winter gullies
* Bank failure, tunnel erosion
* Debris flow, landslide
* “Water moves sediment or soil mass under the force of gravity”

Questions

* Do deep rooting plants effect subsurface soil and water health?
* Might reduce tunnel erosion
* Iron slag nutrient removal
* Vertical tillage detrimental or not?
* No comment
* Drainage tile
* Minimize tunnel erosion
* Nutrient flow with water with/without drainage management