

RUSLE 2 AND WHAT IT MEANS TO NUTRIENT MANAGEMENT PLANS

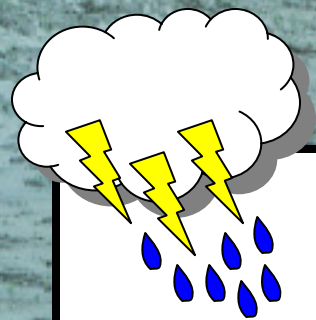
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EROSION IS A SOCIETAL CONCERN

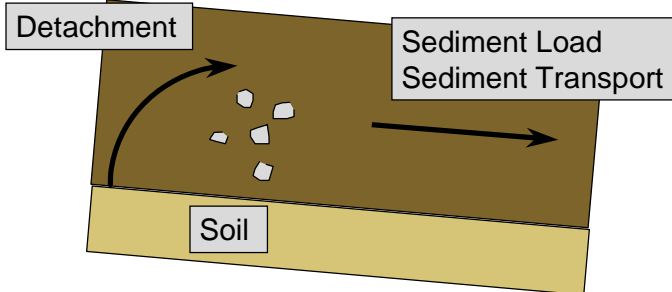
- DEGRADATION OF THE RESOURCE
 - FERTILITY
 - ORGANIC MATTER
 - TILTH
- WATER QUALITY
 - SEDIMENT
 - NUTRIENTS
- PROGRAM COST
 - CHEAPER TO PREVENT
 - STILL EXPENSIVE



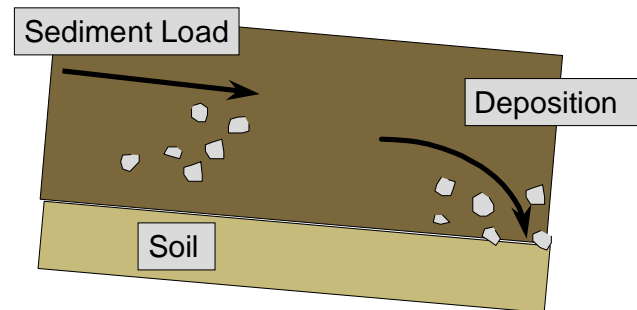
THE SOIL WATER EROSION PROCESS



DETACHMENT



DEPOSITION



PURPOSE OF EROSION AN PREDICTION MODEL

- DEVELOP PLAN REASONABLE PLAN
BASED ON SCIENTIFIC
INFORMATION
- GUIDE MANAGEMENT DECISIONS
- EVALUATE MANAGEMENT IMPACTS
- DETERMINE PRACTICE
COST:BENEFIT
- ASSESS RESOURCE INVENTORY

WHAT IS RUSLE 2

- "GREAT GRANDSON" OF USLE
- MODEL TO PREDICT SOIL LOSS
 - WHERE OVERLAND FLOW OCCURS
 - COMPUTES ANNUAL SHEET/RILL EROSION
 - COMPUTES PARTICLE DISTRIBUTION AND RUNOFF
- CROPLAND, FOREST, LANDFILLS, CONSTRUCTION SITES, SURFACE MINES
- WINDOWS "PULL DOWN" MENUS

WHO AND WHAT OF RUSLE 2


- USDA-ARS, USDA-NRCS, VARIOUS UNIVERSITIES
- ON-GOING PROCESS OVER 70 YEARS
- THOUSANDS OF RESEARCH DATA
- SET UP WITH VARYING LEVELS OF COMPLEXITY
- COMPUTER REQUIREMENTS
 - WINDOWS 98
 - INTERNET EXPLORER BROWSER
 - 64 MB RAM
- DOWNLOAD
 - [HTTP://BIOENGR.AG.UTK.EDU/RUSLE2/](http://bioengr.ag.utk.edu/rusle2/)

CALCULATE SOIL LOSS

$$A(\text{TON/AC/YR}) = R * K * LS * C * P$$

- R = RAINFALL INTENSITY AND AMOUNT
- K = SOIL EROSIVITY
 - TEXTURE
 - STRUCTURE
- LS = SLOPE LENGTH, GRADE, SHAPE
- C = CULTURAL PRACTICES
 - ROTATION
 - TILLAGE
- P = SUPPORTING PRACTICES
 - TERRACES
 - CONTOURS
 - BUFFERS


CROP RESIDUE IS STILL THE BEST EROSION PREVENTION TOOL

- 
- ✓ REDUCED DETACHMENT
 - ✓ HINDERS OVERLAND FLOW
 - ✓ IMPROVED INFILTRATION

HOW MIGHT RUSLE 2 INTERACT WITH NMP

- FARMS NEED A CONSERVATION PLAN WITH FIELDS AT "T" FIRST
- SATISFY "T" MAINLY BY ROTATION AND TILLAGE
- WILL THERE BE LAND FOR MANURE APPLICATION
- FUTURE USE OF THE P INDEX

CONSERVATION PRACTICES ADD FLEXIBILITY

- 
- ✓ CONTOUR BUFFERS
 - ✓ ROTATION OPTIONS
 - ✓ COST SHARE \$

WHAT TO DO WITH MANURE



- ✓ DAILY HAUL AND WINTER APPLICATION
- ✓ RATE LIMITED WITH SURFACE APPLICATION
- ✓ MANURE = RESIDUE

CONFLICT BETWEEN CONSERVATION AND NMP

- NMP WILL ALLOCATE MANURE TO MORE FIELDS ON A FARM
- SOME MAY BE DIRECTED TOWARD SLOPING LAND
- ROTATIONS AND TILLAGE MAY NOT BE ADAPTABLE TO MANURING
- PLANTING PROBLEMS
- MORE TILLAGE = MORE EROSION AND TOTAL P LOSS

INCORPORATION AFFECTS MANURE MANAGEMENT

- MAY TAKE AWAY AVAILABLE ACRES
- AFFECTS TIME MANAGEMENT
- STORAGE WILL BE NEEDED
- APPLICATION IN SPRING AND FALL
- RELIANCE ON CUSTOM APPLICATORS
- RESIDUE FRIENDLY APPLICATION

MANURE APPLICATION AND TILLAGE





✓ 48 t/a STRAW DAIRY
MANURE


✓ INCORPORATION BY CHISEL
WITH SWEEPS

✓ 39 vs. 57 % RESIDUE


RUSLE 2 – INITIAL PROFILE

 Profile: start with this profile


STEP 1: Choose location to set climate: Location  could be any place

STEP 2: Choose soil type: Soil  could be any soil


STEP 3: Set slope topography: Length along slope, ft 1.00
Avg. slope steepness, % 0.0100

STEP 4: Choose management: Base management  Continuous\Bare ground, smooth surface

STEP 5: Set Supporting practices:


Supporting practices	Selection
Contouring	 a up-and-down slope
Strips/barriers	(none)
Diversion/terrace, sediment basin	(none)
Subsurface drainage system	(none)

Row grade, % 0.0100

Surf. cov. values  Surf. cover

RESULTS

Soil loss erod. portion, t/ac/yr	0.014
Detachment on slope, t/ac/yr	0.014
Soil loss for cons. plan, t/ac/yr	0.014
Sediment delivery, t/ac/yr	0.014

Info 

RUSLE 2 – SELECT LOCATION

Profile: start with this profile

STEP 1: Choose location to set climate: Location

STEP 2: Choose soil type: So

STEP 3: Set slope topography: Length
Avg. slope

STEP 4: Choose management: Base management

STEP 5: Set Supporting practices: Contouring
Strips/barriers
Diversion/terrace, sediment basin
Subsurface drainage system

Location
Washington
West Virginia
Wisconsin
Fond Du Lac
Green Bay
Janesville
La Crosse
Madison
Milwaukee
Minnesota
Missouri
Nebraska
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming

Surf. cov. values %

Surf. cover

RESULTS

Soil loss erod. portion, t/ac/yr	0.014
Detachment on slope, t/ac/yr	0.014
Soil loss for cons. plan, t/ac/yr	0.014
Sediment delivery, t/ac/yr	0.014

Info

RUSLE 2 – SELECT SOIL

Profile: start with this profile

STEP 1: Choose location to set climate: Location

STEP 2: Choose soil type: Soil

STEP 3: Set slope topography: Length
Avg. slope

STEP 4: Choose management: Base management

STEP 5: Set Supporting practices: Contouring
Strips/barriers
Diversion/terrace, sediment basin
Subsurface drainage system

a up

%

es

RESULTS

Soil loss erod. portion, t/ac/yr	0.014
Detachment on slope, t/ac/yr	0.014
Soil loss for cons. plan, t/ac/yr	0.014
Sediment delivery, t/ac/yr	0.014

Info

RUSLE 2 – SELECT SLOPE AND ROTATION

Profile: start with this profile*

STEP 1: Choose location to set climate: Location

STEP 2: Choose soil type: Soil

STEP 3: Set slope topography: Length along slope, ft
Avg. slope steepness, %

STEP 4: Choose management: Base management

STEP 5: Set Supporting practices: Contouring ☐ a up ☐
Strips/barriers ☐
Diversion/terrace, sediment basin ☐
Subsurface drainage system ☐

RESULTS

Soil loss erod. portion, t/ac/yr	16
Detachment on slope, t/ac/yr	16
Soil loss for cons. plan, t/ac/yr	16
Sediment delivery, t/ac/yr	16

Info

Base management: Continuous\Bare ground, smooth surface

- Corn grain; chisel sweeps, spring
- Corn grain; chisel tw shov, spring
- Corn grain; chisel twisted shov, fall
- Corn grain; disk 1x, spring
- Corn grain; disk 2x, spring
- Corn grain; manure inj Moldboard plow, spring
- Corn grain; manure, surf Moldboard plow, spring
- Corn grain; Moldboard plow, fall
- Corn grain; Moldboard plow, spring
- Corn grain; no-till

Soil cover

RUSLE 2 – SELECT CONSERVATION PRACTICE(S)

Profile: start with this profile*

STEP 1: Choose location to set climate: Location

STEP 2: Choose soil type: Soil

STEP 3: Set slope topography: Length along slope, ft
Avg. slope steepness, %

STEP 4: Choose management: Base management

STEP 5: Set Supporting practices:

Contouring	<input type="text" value="d standard contouring"/>	Row grade, % <input type="text" value="0.60"/>
Strips/barriers	<input type="text" value="(none)"/>	
Diversion/terrace, sediment basin	<input type="text" value="(none)"/>	Surf. cov. values <input type="text" value="Surf. cover"/>
Subsurface drainage system	<input type="text" value="(none)"/>	


RESULTS


Soil loss erod. portion, t/ac/yr	3.6	Info <input type="text"/>
Detachment on slope, t/ac/yr	3.6	
Soil loss for cons. plan, t/ac/yr	3.6	
Sediment delivery, t/ac/yr	3.6	

RUSLE 2 – “DRILL DOWN” TO FINE-TUNE PRACTICE(S)

Profile: start with this profile*

Management: Continuous\Corn grain; chisel twisted shov, fall*

Graphic  Long-term natural rough., in. 0.24
 Rel. row grade, % Normally used as a rotation? Yes

Rotation builder  open

Operations Info

Management Operations										
Date, m/d/y	Operation	Vegetation	Yield (# harv. units)	Op. depth, in.	Op. speed, mph	External residue	Res. add. / remove, lb/ac	Cover from addition, %	Veg. ret	
10/21/1	no operation									
11/1/1	chisel, twisted shovel			7.0	5.0					
5/1/2	Manure spreader			3.0	5.0	bedding	0	0		
5/5/2	cultivator, field 6-12"sweeps			4.0	6.0					
5/5/2	planter, double disk opnr	corn\Corn, grain	112	2.5	5.0					
10/10/2	harvest killing crop									

Soil loss for cons. plan, t/ac/yr 3.2
 Sediment delivery, t/ac/yr 3.2

lentils
 lettuce
 manure open lots
 manure poultry litter
 manure settling basin
 manure with bedding
 muskmelon
 mustard
 okra
 onion

CUSTOMIZE THE P INDEX

- RUSLE 2 WOULD BE THE BASE MODEL
- ESTIMATE RUNOFF VOLUME
- TRACK PARTICLE SIZE (CLAY)
- MODEL MOVEMENT OVER ENTIRE LANDSCAPE, NOT JUST A FIELD
- POTENTIALLY P INDEX CALCULATION WILL BE PART OF RUSLE 2

USE RUSLE 2 TO IMPROVE WHOLE-FARM NUTRIENT PLANNING

- RUN P INDEX ON EACH FIELD
- ANALYZE IMPACT OVER WHOLE FARM
- ADJUST NUTRIENT MANAGEMENT TO FIT LANDSCAPE

SUMMARY

- RUSLE 2 APPEARS TO OFFER FLEXIBILITY
- RELATIVELY EASY TO USE
- AVAILABLE TO THE FARMER, CROP ADVISER, EDUCATOR
- NOT READY FOR USE YET IN WIS.
 - NEED CLIMATE, SOIL DATA
- HOPE TO BUILD P INDEX INTO RUSLE 2
- TRAINING SESSIONS THIS SPRING