

RUSLE 2 AND WHAT IT MEANS TO NUTRIENT MANAGEMENT PLANS

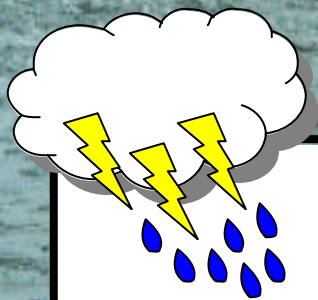
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EROSION IS A SOCIETAL CONCERN

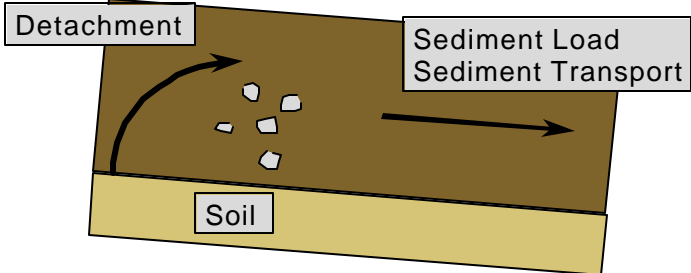
- DEGRADATION OF THE RESOURCE
 - FERTILITY
 - ORGANIC MATTER
 - TILTH
- WATER QUALITY
 - SEDIMENT
 - NUTRIENTS
- PROGRAM COST
 - CHEAPER TO PREVENT
 - STILL EXPENSIVE



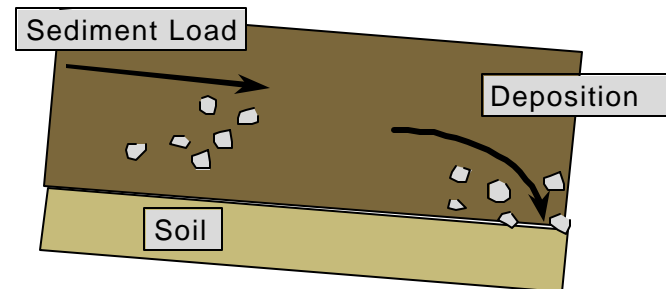
THE SOIL WATER EROSION PROCESS



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:

Contouring		a up-and-down slope	Row grade, %	0.0100
Strips/barriers		(none)		
Diversion/terrace, sediment basin		(none)	Surf. cov. values	 Surf. cover
Subsurface drainage system		(none)		

RESULTS

Soil loss erod. portion, t/ac/yr	0.014	Info 
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	

RUSLE 2 – SELECT LOCATION

Profile: start with this profile

STEP 1: Choose location to set climate:

STEP 2: Choose soil type:

STEP 3: Set slope topography:

STEP 4: Choose management:

STEP 5: Set Supporting practices:

Location: could be any place

Washington

West Virginia

Wisconsin

Fond Du Lac

Green Bay

Janesville

La Crosse

Madison

Milwaukee

Wyoming

Contouring

Strips/barriers

Diversion/terrace, sediment basin

Subsurface drainage system

Base management

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
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

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

rf. 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)"/>	Surf. cov. values	<input type="text" value="Surf. cover"/>
Diversion/terrace, sediment basin	<input type="text" value="(none)"/>		
Subsurface drainage system	<input type="text" value="(none)"/>		

RESULTS


Soil loss erod. portion, t/ac/yr	3.6
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


Info

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









Profile: start with this profile*

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

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

Rotation builder  open

Operations Info

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. n
+	-									
10/21/1		no operation								
11/1/1		chisel, twisted shovel			7.0	5.0				
5/1/2		Manure spreader			3.0	5.0	 ...edding	0	0	
5/5/2		cultivator, field 6-12"sweeps			4.0	6.0	lentils			
5/5/2		planter, double disk opnr	 corn\Corn, grain	112	2.5	5.0	lettuce			...e (wide
10/10/2		harvest killing crop					manure open lots		87	
							manure poultry litter			
							manure settling basin			
							manure with bedding			
							muskmelon			
							mustard			
							okra			
							onion			

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

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 THE SYSTEM 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