



CIG Project Data Needed for Modeling Purposes

The models to be evaluated or validated within the CIG project (Demonstrating and enhancing risk assessment tools to determine efficiency and cost-effectiveness of innovative nutrient reduction strategies in the Mississippi Delta) are briefly described below.

APEX is a flexible and dynamic tool that is capable of simulating a wide array of management practices, cropping systems, and other land use across a broad range of agricultural landscapes, including whole farms and small watersheds. The model can be configured for novel land management strategies, such as filter strip impacts on pollutant losses from upslope cropfields, intensive rotational grazing scenarios depicting movement of cows between paddocks, vegetated grassed waterways in combination with filter strip impacts, and land application of manure removal from livestock feedlots or waste storage ponds.

RUSLE2 estimates rates of rill and interrill soil erosion caused by rainfall and its associated overland flow. Detachment (separation of soil particles from the soil mass) by surface runoff erodes small channels (rills) across the hillslope. Erosion that occurs in these channels is called rill erosion. Erosion on the areas between the rills, the interrill areas, is called interrill erosion. Detachment on interrill areas is by the impact of raindrops and waterdrops falling from vegetation. The detached particles (sediment) produced on interrill areas is transported laterally by thin flow to the rill areas where surface runoff transports the sediment downslope to concentrated flow areas (channels).

NI (The Nitrogen Index) is a tool that assists users in making quickly assessments of the risk of nitrogen movement into the environment, by integrating data on a series of management practices, weather conditions, soil characteristics and off-site factors.

APPLE is a Microsoft Excel spreadsheet model that runs on an annual time step. The model simulates dissolved and sediment bound phosphorus (P) loss in surface runoff only. It does not consider subsurface loss of P through leaching or artificial drainage. It is intended to estimate edge-of-field P loss for uniform fields of several hectares in size, or smaller. **APPLE** does not simulate P loss through grassed waterways or buffers that may occur beyond the field edge. The model will consider all kinds of animal manure (beef, dairy, poultry, swine), applied either by machine or by grazing beef or dairy cattle, but consider only highly soluble commercial fertilizers such as superphosphate, triple superphosphate, or mono- and di-ammonium phosphate.

The Nutrient Tracking Tool (NTT) estimates nutrient (nitrogen and phosphorus) and sediment losses from fields managed under a variety of cropping patterns and management practices through its user-friendly, Web-based linkage to the Agricultural Policy Environmental eXtender (APEX) model.

The P index (IP) is a tool to assess the site and management practices for potential risk of phosphorus movement to water bodies.

Parameter/Model	APEX	RUSLE2	MS-PI	APLE	NI	NTT	Field Obs.	Database ¹
1. General Information								
1.1. Topographic maps	X							
1.2. Slope Length	X	X				X		
1.3. Slope angle	X	X						
1.4. Drainage conditions	X							
• Tile drain Depth	X							
• Tile drain spacing	X							
• Outlets empty conditions	X							
1.5. Field distance to surface waterbodies			X		X			
1.6. Field distance to BMP's			X		X			
1.7. Field distance to drinking water well			X		X			
1.8. Number of years of cultivation	X							
1.9. Land Use								
1.10. Runoff				X	X			
1.11. Grazing animals inventory				X				
• Number of animals (including beef cattle and calves, dairy lactating and dry cows, and dairy heifers and calves).								
• Number of days in field								
2. Climate								
2.1. Annual Precipitation	X		X	X	X			
2.2. Temperature	X							
2.3 Wind speed	X							
2.4. Evaporation	X							
2.5. Solar radiation	X							
2.6. Relative humidity	X							
2.7. Erodibility "R"		X						

Table 1. Data Needed for Modeling Purposes

¹ Data refers to data available in databases such as USDA-NRCS database.

Parameter/Model	APEX	RUSLE2	MS-PI	APLE	NI	NTT	Field Obs.	Database ¹
3. Soils								
3.1. Soil Erodibility “K”		X						
3.2. Soil series	X	X						
3.3. Soils hydrologic group and condition	X	X			X			
3.4. Support Practices	X	X						
3.5. Soil Permeability Class	X		X		X			
3.6. Soil erosion				X				
3.7. Soils Test P (STP)	X		X					
• STP Mehlich III				X				
• Water soluble P								
• P sorption Rate								
• Other STP method								
3.8. Physical properties	X							
• Depth to bottom layer				X	X			
• Bulk density					X			
• Soil moisture								
• Field capacity								
• Witting point								
• Texture			X	X				
• Saturated conductivity								
• Hydraulic conductivity								
• Electrical conductivity								
• Crop residue								

Table 1. Data Needed for Modeling Purposes (Continuation)

**Table
Data**

1.

Parameter/Model	APE X	RUSLE2	MS-PI	APLE	NI	NTT	Field Obs.	Database ¹
3. Soils (Continuation)								
3.9. Chemical properties	X							
• pH					X			
• Organic P								
• Organic N								
• Soluble N								
• Cations (Ca, Mg, K)								
• CEC								
• Organic Carbon								
• Organic Matter Content				X	X			
• CaCO ₃								
• Maximum P retention Capacity								
• Equilibrium P concentration								
• Freundlich Distribution Coefficient								
• Structural litter								
• Metabolic litter								
• C content metab. litter								
• C content struct. litter								
• C content of biomass								
• N content metab. litter								
• N content struct. litter								
• N content of biomass								
• N-O3N					X			
• NH4-N					X			

Needed for Modeling Purposes (Continuation)

**Table
Data**

1.

Parameter/Model	APEX	RUSLE2	MS-PI	APLE	NI	NTT	Field Obs.	Database ²
4. Crops								
4.1. Cover Management	X	X						
4.2. Tillage	X		X					
4.3. Crops and/or sequence of rotation	X		X		X			
4.4. Pesticides Application	X		X		X			
4.5. Yield					X			
4.6. Crop P uptake			X	X				
4.7. Crop N uptake								
<i>Note: for all the components in section 4, the dates, methods, practice name and description are necessary)</i>								
5. Irrigation and Fertilizer								
5.1. Irrigation	X		X					
• Pre-Plant irrigation					X			
• Post-plan irrigation					X			
• Concentration of N (NO3-N, organic N)					X			
5.2. Solid Organic and Inorganic P applications rates and methods	X		X	X	X			
• Amount of P (P2O5, TP)								
• Amount of N (NH4-N, TN)								
5.3. Liquid Organic and Inorganic P applications rates and methods	X		X	X	X			
• Amount of P (P2O5, TP)								
• Amount of N (NH4-N, TN)								
<i>Note: for all the components in section 5, the dates, methods, practice name and description are necessary)</i>								

² Data refers to data available in databases such us USDA-NRCS database.

Needed for Modeling Purposes (Continuation)

Table 1. Data Needed for Modeling Purposes (Continuation)

Parameter/Model	APEX	RUSLE2	MS-PI	APLE	NI	NTT	Field	Database ³
6. Crops								
6.1. Cover Management	X	X						
6.2. Tillage	X		X					
6.3. Irrigation	X		X					
• Pre-Plant irrigation					X			
• Post-plan irrigation					X			
• Concentration of N (NO3-N, organic N)					X			
6.4. Solid Organic and Inorganic P applications rates and methods	X		X		X			
• Amount of P (P2O5, TP)								
• Amount of N (NH4-N, TN)								
6.5. Liquid Organic and Inorganic P applications rates and methods	X		X		X			
• Amount of P (P2O5, TP)								
• Amount of N (NH4-N, TN)								
6.6. Crops and/or sequence of rotation	X		X					
6.7. Pesticides Application	X		X					
Note: for all the components in the crops section, the dates, methods, practice name and description are necessary)								
7. Water Quality								
7.1. Runoff depth	X							
7.2. Suspended sediments concentration	X							
7.3. P unfiltered concentration	X							
7.4. Ortho-P filtered concentration	X							
8. BMP's (Based on NRCS practice Standard Name)⁴	X	X	X					

³ Data refers to data available in databases such as USDA-NRCS database.

⁴ Review NRCS Practice Standard Name List in annex 1

Annex 1. NRCS Practice Standard Name List

No	BMP Name	Code
1	Residue Management	329A – 329B – 329 C - 344
2	Constructed Wetlands	656
3	Conservation Crop Rotation	332
4	Contour Buffer Strip	585
5	Contour Strip Cropping	362
6	Diversion	362
7	Field Border	386
8	Filter Strip	393A
9	Forage Harvest Management	590
10	Irrigation Water Management	449
11	Nutrient Management	590
12	Prescribed Grazing	528A
13	Strip-cropping, Field	586
14	Runoff Management System	
15	Use Exclusion	472
16	Waste Utilization	633
17	Mulching	484
18	Terrace	600
19	Pond	378
20	Grassed waterway	412
21	Fencing	382
22	Riparian Forest Buffer	391
23	Riparian Herbaceous Cover	390