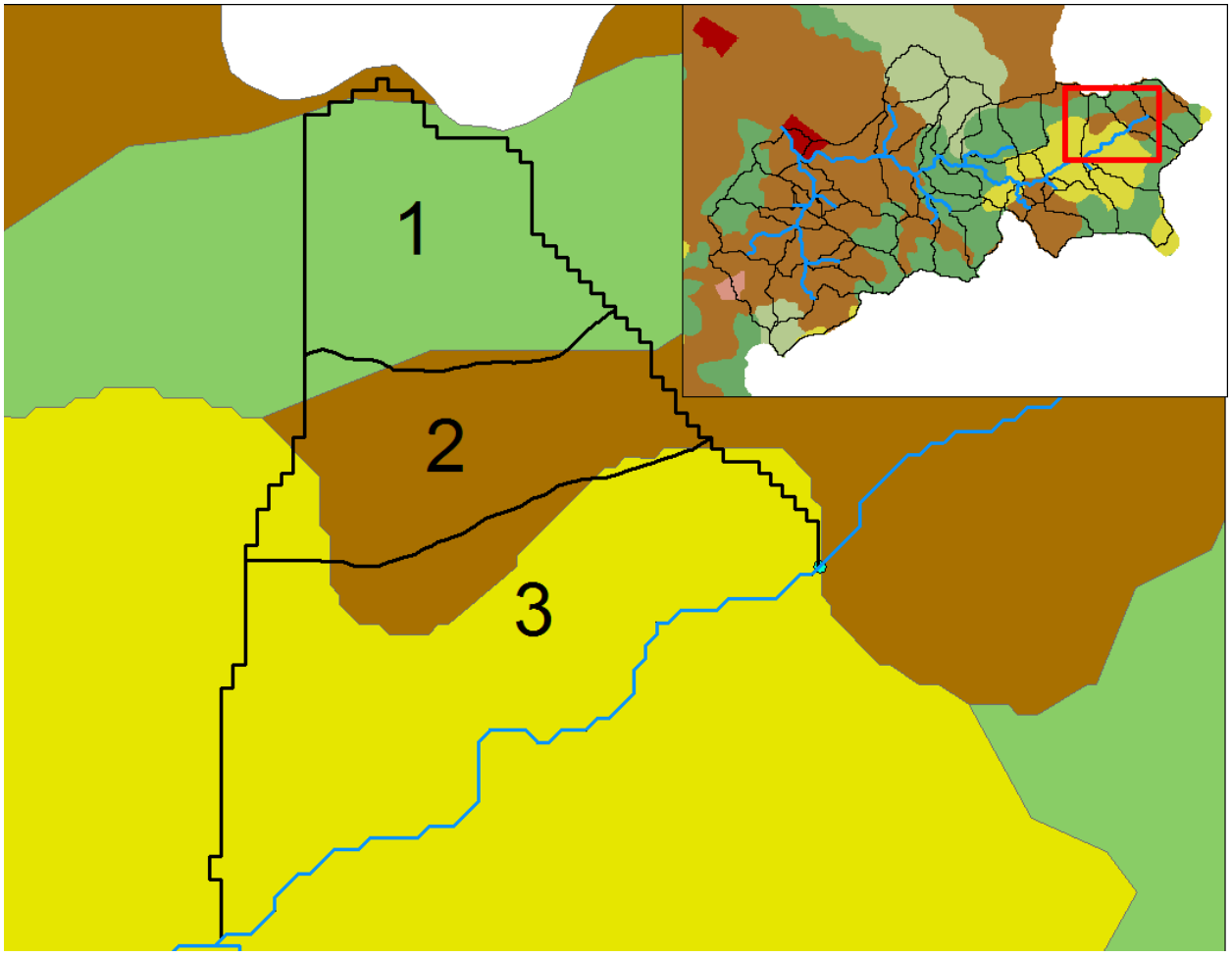
Working with the KINEROS model outside of AGWA

Introduction	In this exercise you will modify a KINEROS2 parameter file and run KINEROS2 outside of the AGWA environment.
Goal	To familiarize yourself with KINEROS input and output files.
Assignment	Subdivide a plane element into a cascade of planes and adjust erosion parameters to reflect cover and management practices.

Part 1: Subdivide a plane into 3 cascading planes to better represent land cover distribution

The watershed discretization shown below (inset) includes a plane containing 3 different classes of land cover:



When there is more than one class of land cover on a plane, AGWA computes area-weighted average values of the parameters derived from land cover (canopy cover, interception depth and Manning n). To avoid this averaging, we will subdivide the plane into 3 planes, each with only one class of land cover. In ArcGIS, the division was made along elevation contours, such that each plane contains predominately one class of land cover. The following table characterizes the 3 subareas:

Polygon	1	2	3
Area (ha)	39.79	41.95	89.58
Slope	0.606	0.129	0.048
Class	Deciduous	Crops	Pasture
Cover	0.50	0.70	0.57
Interception	1.15	2.80	1.75
Manning n	0.400	0.400	0.130

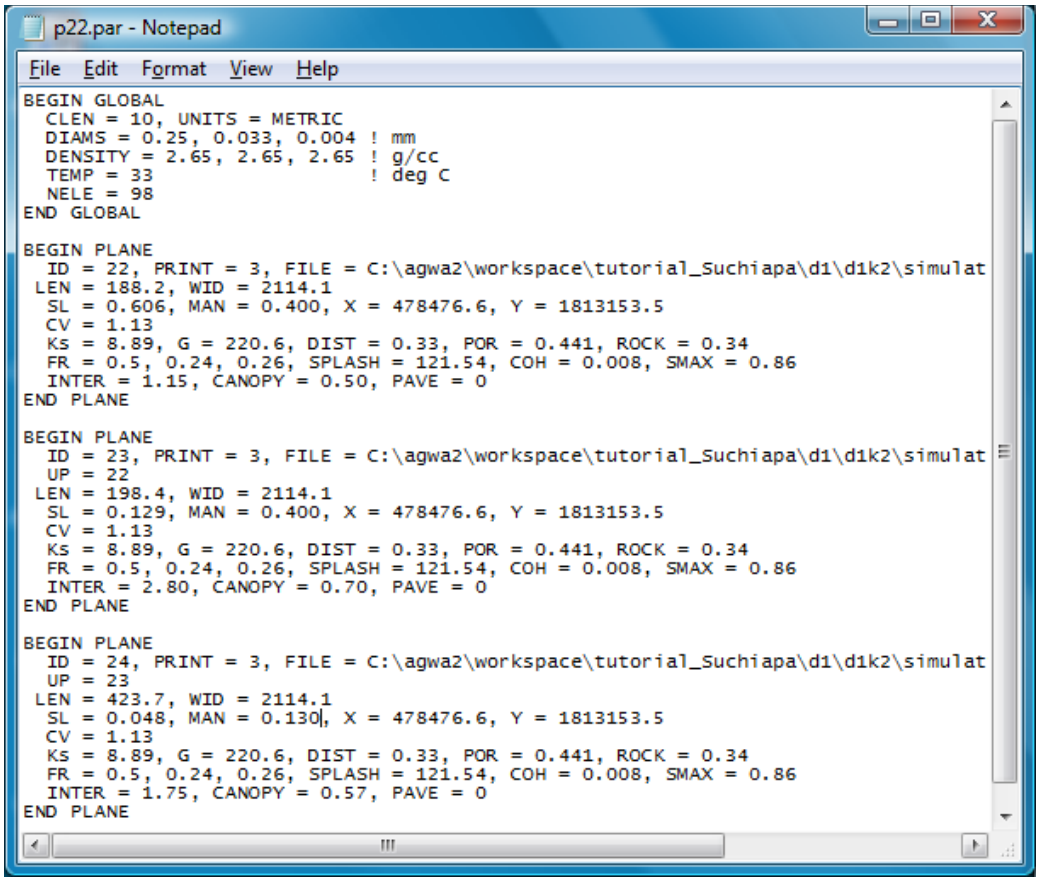
PROCEDURE

Open **Windows Explorer** (see *Programs->Accessories*) and navigate to *C:\K2*

Open **Notepad** (see *Programs->Accessories*, it would be helpful to send it to the *Desktop* as a *shortcut*).

Select *File->Open*, navigate to *C:\K2*, set the file name filter to *"All Files (*.*)*, and select p22.par

Copy the PLANE parameter block and paste 2 copies onto the end of the file. Assign new (unique) ID numbers to the 2 new planes and insert a line in each to assign the plane above it as the upstream contributor (UP). Edit the slope, canopy cover, interception and Manning n parameters according to the above table. For length, divide the new areas by the plane width (2114.1m) to get the new lengths:



Select *File->Save As*, enter cascade.par, *Save as type: All Files (*.*)*, and make sure the path is *C:\K2*

Select *File->Open*, set the file name filter to *All Files (*.*)*, and select kin.fil

Change "`p22.par`" to "`cascade.par`" and "`p22.out`" to "`cascade.out`", then *File->Save*

In **Windows Explorer**, double-click k2.exe

The program will ask "*Repeat previous run?*"

Type "y" and "Enter"

The program will run using the new parameter and output files specified in kin.fil

In **Notepad**, select *File->Open*, set the file name filter to *All Files (*.*)*, and select p22.out (this is the output file from using p22.par).

Open a new instance of **Notepad** (Untitled), select *File->Open*, set the file name filter to *All Files (*.*)*, and select cascade.out

You should now have 2 instances of Notepad open, one with p22.out and the other with cascade.out. It is interesting to note that although the cascade simulated a higher peak (from 2.54 to 3.20 m^3/s) and volume (from 6,073 to 7,219 m^3), the sediment outflow was significantly reduced (from 170,610 to 35,349 kg). This is likely due to increased deposition at the bottom of the cascade where the slope was reduced from 0.195 to 0.048. In this case the hillslope profile was probably a bigger factor than the land cover.

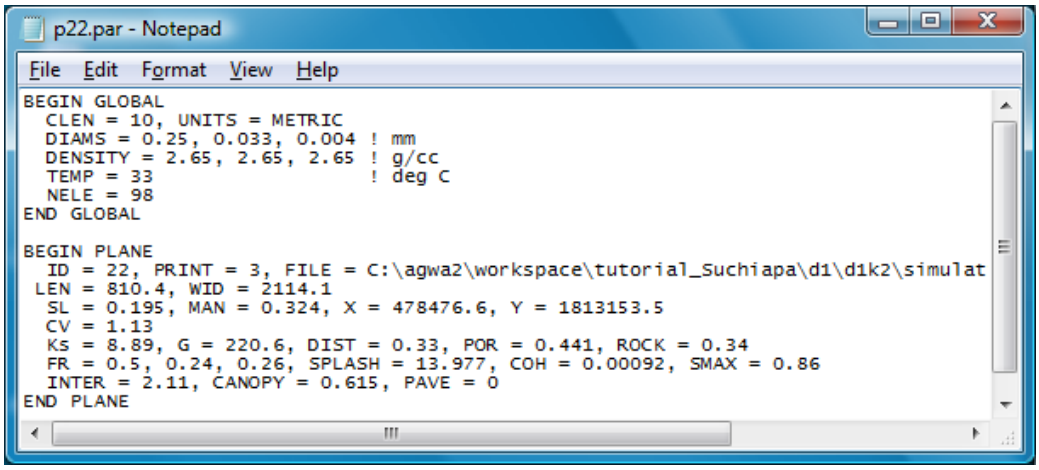
Part 2: Adjusting erosion parameters to reflect cover and management practices

Currently AGWA does not adjust the SPLASH and COHESION parameters as a function of land cover class. Erosion is affected indirectly through the canopy cover, interception and hydraulic roughness parameters, but the rain splash and hydraulic erosion parameters are estimated solely from the USLE erodibilty factor obtained from a soils database. The reference condition for this erodibilty factor is continuous tillage along the direction of slope, i.e. the maximum erodibilty. In this exercise we will apply adjustments based on the USLE cover/management factor to simulate both conventional tillage and no-till practices. The adjustment factors we will be using are 0.115 for conventional tillage and 0.019 for no-till. Note that these values were obtained for the lower elevations of the Pataha Creek Watershed in southeastern Washington State, USA, so are not necessarily representative of this watershed, which is in the Chiapas region of Mexico (see Guobin Fua, Shulin Chena, Donald K. McCool. Modeling the impacts of no-till practice on soil erosion and sediment yield with RUSLE, SEDD, and ArcView GIS, Soil & Tillage Research 85 (2006) 38–49).

PROCEDURE

In one instance of **Notepad**, select *File->Open*, set the file name filter to *All Files (*.*)*, and select p22.par

Multiply both the SPLASH and COH parameter values by 0.115 and type in the new values:



Select *File->Save As*, enter p22-till.par, *Save as type: All Files (*.*)*, and make sure the path is *C:\K2*

Select *File->Open*, set the file name filter to *All Files (*.*)*, and select kin.fil

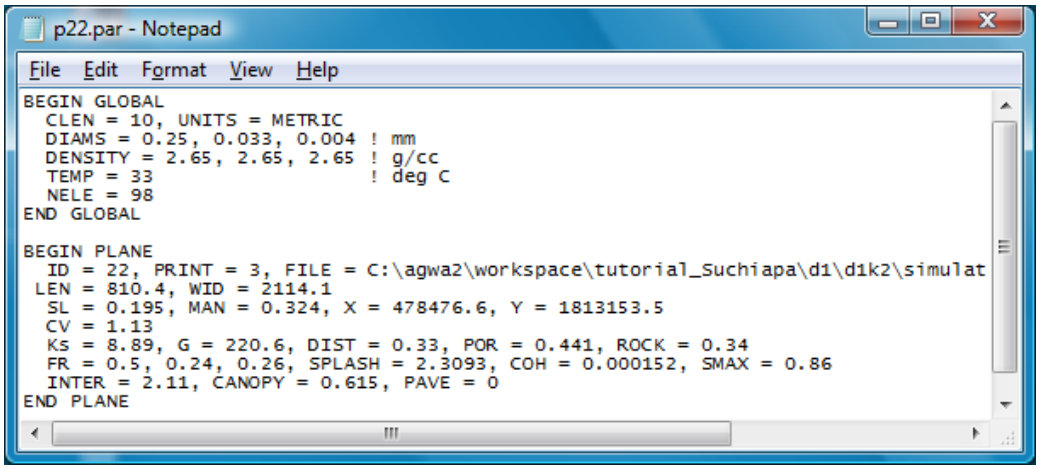
Change "`p22.par`" to "`p22-till.par`" and "`p22.out`" to "`p22-till.out`", then *File->Save*

In **Windows Explorer**, double-click k2.exe, etc.

In **Notepad**, select *File->Open*, set the file name filter to *All Files (*.*)*, and select p22-till.out

In the other instance of **Notepad**, select *File->Open*, set the file name filter to *All Files (*.*)*, and select p22.par

Multiply both the SPLASH and COH parameter values by 0.019 and type in the new values:



Select *File->Save As*, enter p22-notill.par, *Save as type: All Files (*.*)*, and make sure the path is *C:\K2*

Select *File->Open*, set the file name filter to *All Files (*.*)*, and select kin.fil

Change "`p22-till.par`" to "`p22-notill.par`" and "`p22-till.out`" to "`p22-notill.out`", then File->Save

In **Windows Explorer**, double-click k2.exe, etc.

In **Notepad**, select *File->Open*, set the file name filter to All *Files (*.*)*, and select p22-notill.out

As expected, there is a dramatic reduction in sediment outflow, from 97,662 to 34,181 kg, but the difference is not as dramatic as in the previous exercise, again illustrating the importance of slope profile to erosion simulation.