# EVAAL Test with LiDAR Data

Tutorial location - C:Files-master\_Tutorial\_v1\_0\_SEP2014.pdf

## Condition DEM

**Error 1:**

Traceback (most recent call last):  
 File "<string>", line 1096, in execute  
 File "<string>", line 134, in demConditioning  
RuntimeError: ERROR 010240: Could not save raster dataset to C:\GIS\GLPF\FDL\_LiDAR\EVAAL\_LiDAR\fdl\_sub12\_conditioned with output format GRID.  
  
Failed to execute (conditionTheLidarDem).  
Failed at Wed Oct 29 18:36:50 2014 (Elapsed Time: 16 minutes 16 seconds)

## Download precipitation data

Used default inputs from tutorial:

* Frequency: 10 years
* Duration: 24 hours

## Create curve raster number

* ~~[x] Download CDL~~ server down
  + ~~used locally-stored CDL~~
  + Changed end year to 2012 and server fetch executed properly
* Start year: 2008
* End year: ~~2013~~ 2012

## Identify internally-draining areas

1. [x] High Curve
2. [x] Low Curve

## Recondition DEM for internally draining areas

1. [x] High Curve
2. [x] Low Curve

## Calculate Stream Power Index

1. Inputs:
   * conditioned DEM
   * reconditioned DEM (excluding internally-draining areas)
2. Flow accumulation threshold, default of 50,000.
   * [x] default
3. High and low
   * [x] high
   * [x] low

## Estimate sheet & rill erosion

1. Rasterize K-factor for USLE
   * gSSURGO
   * K-factor field
   * Conditioned DEM
   * Watershed area
2. Rasterize C-factor for USLE
   * CDL
   * Years of CDL to use
     + Same as earlier CDL step: 2008-2012
   * Watershed area
   * Conditioned DEM
3. Calculate soil loss using USLE
   * both high and low infiltration rate DEMs (reconditioned) AND
   * high and low cFactors
   * erosivity constant (optional) - left blank
   * flow accumulation constant (default 1000) - left at default
   * [x] IDAhigh, cFact high
   * [x] IDAhigh, cFact low
   * [x] IDAlow, cFact high
   * [x] IDAlow, cFact low
4. Calculate erosion vulnerability index
   * soil loss index (previous step)
   * SPI
   * Optional summary boundaries (none)
   * conditioned DEM
   * SPIhigh
     + [x] idaHcfactH (spiH1)
       - worst case (high stream power index, poor infiltration-related management, high c-factor/crop rotation that increases runoff)
     + [x] idaHcfactL (spiH2)
     + [x] idaLcfactH (spiH3)
     + [x] idaLcfactL (spiH4)
   * SPI low
     + [x] idaHcfactH (spiL1)
     + [x] idaHcfactL (spiL2)
     + [x] idaLcfactH (spiL3)
     + [x] idaLcfactL (spiL4)
       - best case (low stream power index, good infiltration-related management, low c-factor/crop rotation that facilitates infiltration)

## Analysis

**Opportunities for BMP implementation**

* Subtract best case from worst case and ID areas for prioritization
  + spiH1 - spiL4

# EVAAL Test with 10-Meter DEM

## 6.1 Condition the DEM

~~Did not run for 10-meter data since it would have been impossible to ID potential culverts using the data.~~

~~However, did run raster clip using watershed boundaries from LiDAR steps.~~

After getting an error in step 6.2.2, went back and ran this step with an empty culverts layer in order to generate the optimized fill.

## 6.2 Identify Internally Drained Areas

### 6.2.1 Download precipitation data

Used default inputs from tutorial:

* Frequency: 10 years
* Duration: 24 hours

### 6.2.2 Create Curve Number Raster

* ~~[x] Download CDL~~ server down
  + ~~used locally-stored CDL~~
  + Changed end year to 2012 and server fetch executed properly. Suspect chosen years aren’t actually the issue, but pinging the server twice is required to establish connection.
* Start year: 2008
* End year: ~~2013~~ 2012

Encountered error:

Traceback (most recent call last):  
 File "<string>", line 1318, in execute  
 File "<string>", line 430, in calculateCurveNumber  
ValueError: invalid literal for int() with base 10: '8.81868329198578'  
  
Failed to execute (createCurveNumberRaster).

Went back and ran ‘condition DEM’ with an empty culverts layer. *Success*

### 6.2.3 Identify internally-draining areas

1. [x] High Curve
2. [x] Low Curve

**Note:** neither yeilded *any* internally-drained areas. Excluded rasters are identical for High and Low curve. Does this mean all subsequent steps won’t have high and low components?

## 6.3 Recondition DEM for internally draining areas

High and low curves were the same, so only one reconditioned DEM results. Reconditioned is identical to conditioned.

## 6.4 Calculate Stream Power Index

1. Inputs:
   * conditioned DEM
   * reconditioned DEM (excluding internally-draining areas)
2. Flow accumulation threshold, default of 50,000.
   * [x] default
3. ~~High and low~~
   * ~~[x] high~~
   * ~~[x] low~~
   * Just one run.

## 6.5 Estimate sheet & rill erosion

### 6.5.1 Rasterize K-factor for USLE

* gSSURGO
* K-factor field
* Conditioned DEM
* Watershed area

### 6.5.2 Rasterize C-factor for USLE

* CDL
* Years of CDL to use
  + Same as earlier CDL step: 2008-2012 (had to try twice again)
* Watershed area
* Conditioned DEM

### 6.5.3 Calculate soil loss using USLE

* ~~both high and low infiltration rate DEMs (reconditioned) AND~~
* high and low cFactors
* erosivity raster (optional) - none
* erosivity constant (optional) - left blank
* flow accumulation constant (default 1000) - left at default
* ~~[x] IDAhigh, cFact high~~
* ~~[x] IDAhigh, cFact low~~
* ~~[x] IDAlow, cFact high~~
* ~~[x] IDAlow, cFact low~~
* [x] cFact High
* [x] cFact Low

### 6.5.4 Calculate erosion vulnerability index

* soil loss index (previous step) - high and low
* SPI
* Optional summary boundaries (none)
* conditioned DEM
* ~~SPIhigh~~
  + ~~[x] idaHcfactH (spiH1)~~
  + ~~[x] idaHcfactL (spiH2)~~
  + ~~[x] idaLcfactH (spiH3)~~
  + ~~[x] idaLcfactL (spiH4)~~
* ~~SPI low~~
  + ~~[x] idaHcfactH (spiL1)~~
  + ~~[x] idaHcfactL (spiL2)~~
  + ~~[x] idaLcfactH (spiL3)~~
  + ~~[x] idaLcfactL (spiL4)~~
* [x] soilLoss\_lowCFact
  + best case (low c-factor/crop rotation that facilitates infiltration)
* [x] soilLoss\_hiCFact
  + worst case (high c-factor/crop rotation that increases runoff)

## Analysis

**Opportunities for BMP implementation**

* Subtract best case from worst case and ID areas for prioritization
  + EVI\_hiCFact - EVI\_lowCFact
  + Can’t seem to calculate in geodatabase. Saving output outside of directory returns an empty raster. Exported both as GRID files outside the geodatabase, ran Raster Calculator and was successful.

**Sum EVI based on CLUs**