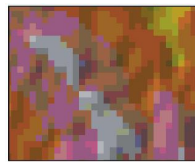


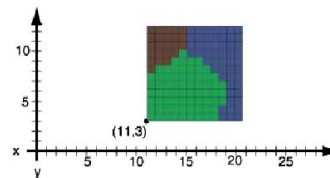
Raster Data Analysis

Raster Data Model

- Cells (Pixels)
- Cell value



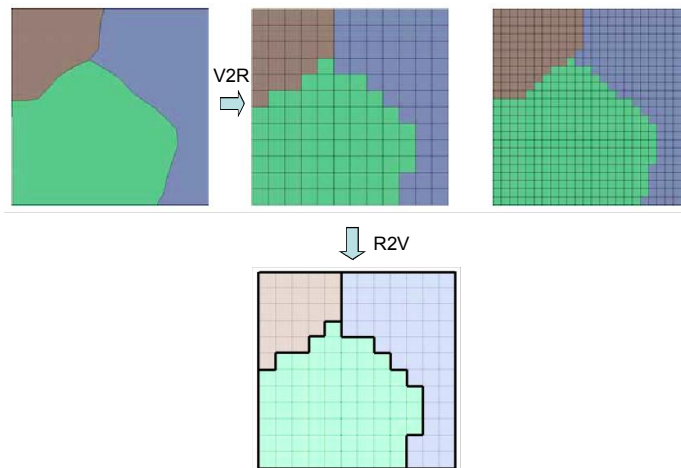
- x, y cell sizes
- Geographic coordinates



Attributes

Value	Count	Name	Suitability	Type
2	36672	Cropland and pastureland	4	Agriculture
3	33391	Urban and industrial	5	Urban
10	212	Cleavings and brushfields	5	Cleared
21	1393	Cottonwood	4	Riparian
463	142	Ash-Cottonwood	3	Woodland
476	7295	Oak	3	Woodland
505	1112	Douglas fir	2	Forest
510	6557	Mixed evergreen-broadleaf	3	Forest
512	7943	Douglas fir-Hemlock-Cedar	1	Forest

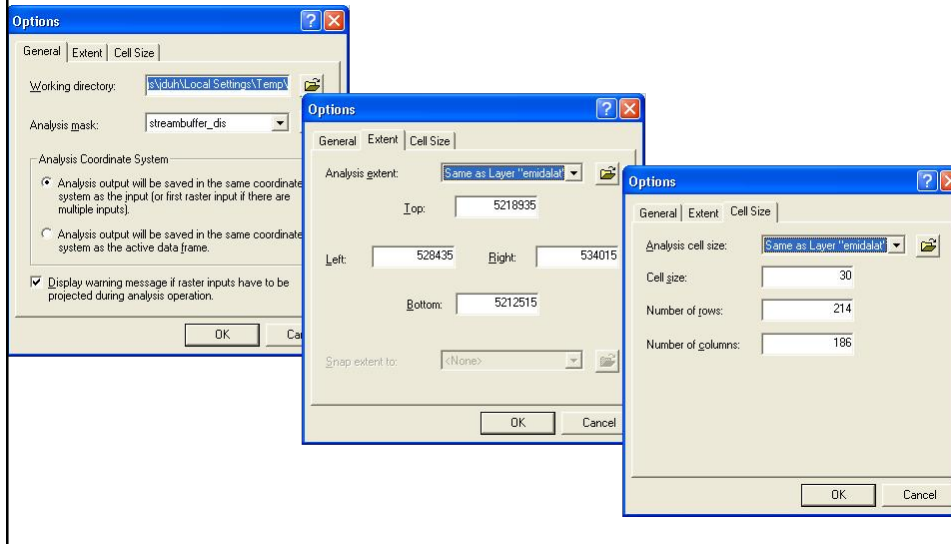
Raster to Vector / Vector to Raster



ArcGIS Spatial Analyst

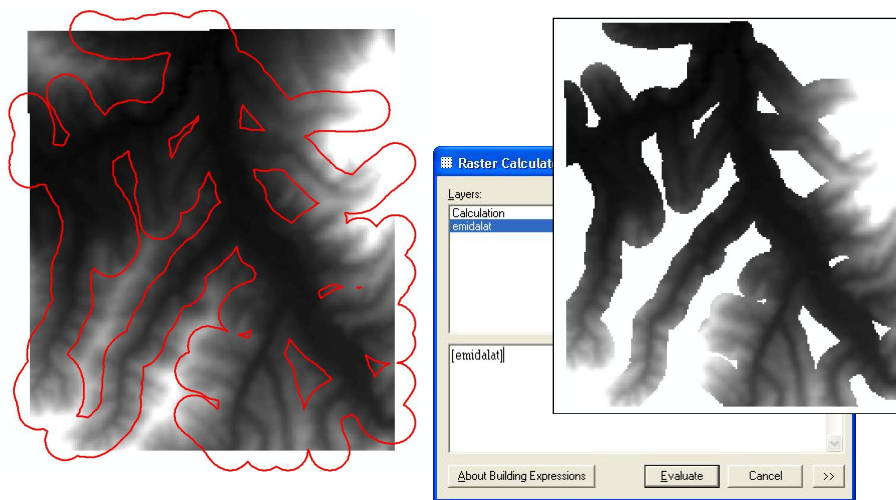
- Mainly for raster data analysis
- Arctoolbox: Spatial Analyst Tools
- Spatial Analyst Toolbar
 - Raster Calculator

Spatial Analyst Option Menu



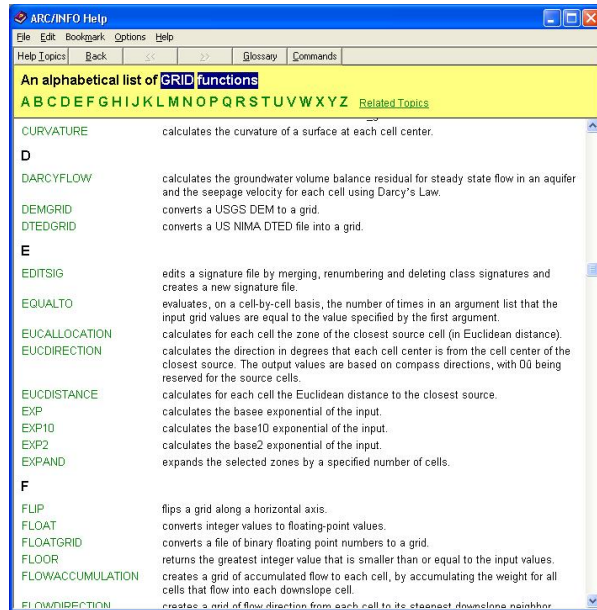
Raster Calculator

- the most powerful tool in spatial analyst



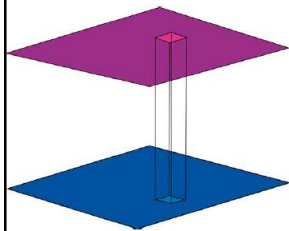
Raster Calculator Functions

- Arcinfo Workstation / Arcdoc
- > 200 functions

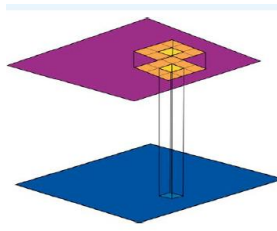


Raster Operations

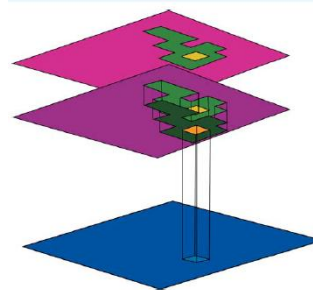
Local operation
(majority)



Focal operation
(focalmajority)



Zonal operation
(zonalmajority)



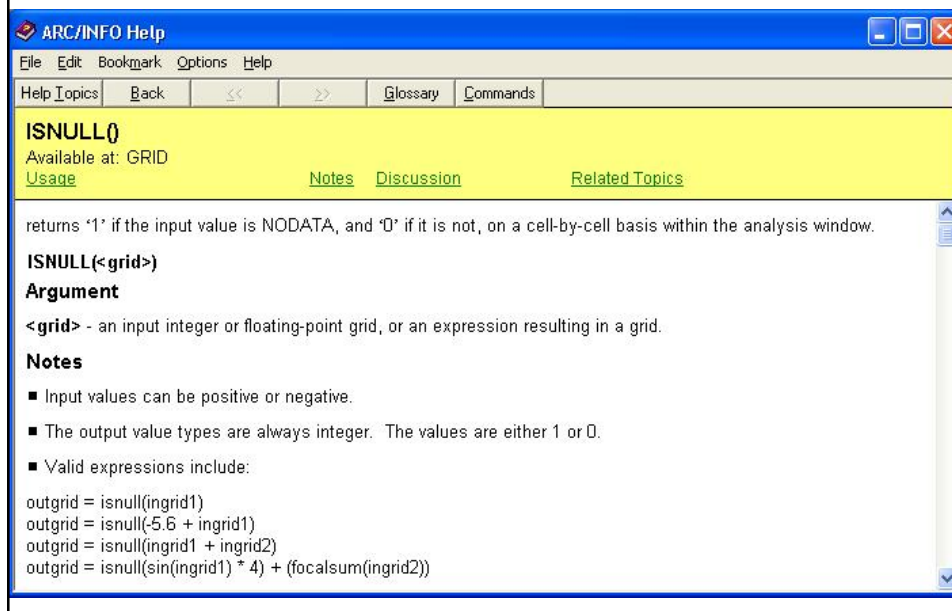
Global operation
(costdistance)

Application functions

Working with Nodata in RC

- ISNULL: convert Nodata to a value
- SETNULL: set cell value to Nodata
- CON: conditional function
- Examples
 - Replace Nodata with 0 in a DEM
`Outgrid = con(isnull([dem]), 0, [dem])`
 - Set slope > 15 to Nodata on the DEM
`Lowrisk = setnull([slope]> 15, [dem])`

ISNULL() Function



The screenshot shows the ARC/INFO Help window with the following content:

ISNULL()
Available at: GRID
[Usage](#) [Notes](#) [Discussion](#) [Related Topics](#)

returns '1' if the input value is NODATA, and '0' if it is not, on a cell-by-cell basis within the analysis window.

ISNULL(<grid>)
Argument
<grid> - an input integer or floating-point grid, or an expression resulting in a grid.

Notes

- Input values can be positive or negative.
- The output value types are always integer. The values are either 1 or 0.
- Valid expressions include:

```
outgrid = isnull(ingrid1)
outgrid = isnull(-5.6 + ingrid1)
outgrid = isnull(ingrid1 + ingrid2)
outgrid = isnull(sin(ingrid1) * 4) + (focalsum(ingrid2))
```

SETNULL() Function

The screenshot shows the ARC/INFO Help window with the title bar 'ARC/INFO Help'. The menu bar includes 'File', 'Edit', 'Bookmark', 'Options', and 'Help'. The toolbar contains 'Help Topics', 'Back', '<<', '>>', 'Glossary', and 'Commands'. The main content area has a yellow header with the title 'SETNULL()' and the text 'Available at: GRID'. Below the header are three links: 'Usage', 'Notes', 'Discussion', and 'Related Topics'. The main text describes the function: 'returns NODATA if the evaluation of the input condition is 'TRUE'; if it 'FALSE', returns the value specified by the grid, scalar or number on a cell-by-cell basis within the analysis window.' The function signature is 'SETNULL(<condition>, {grid | scalar | number})'. The 'Arguments' section defines: '<condition>' as an input condition to be tested for Boolean 'TRUE' or 'FALSE'; '{grid | scalar | number}' as the output value if the condition is FALSE; 'grid' as an input integer or floating-point grid; 'scalar' as the current value of the specified scalar variable; and 'number' as any integer or floating-point value.

SETNULL()
Available at: GRID
[Usage](#) [Notes](#) [Discussion](#) [Related Topics](#)

returns NODATA if the evaluation of the input condition is 'TRUE'; if it 'FALSE', returns the value specified by the grid, scalar or number on a cell-by-cell basis within the analysis window.

SETNULL(<condition>, {grid | scalar | number})

Arguments

<condition> - input condition to be tested for Boolean 'TRUE' or 'FALSE'. The condition can be a relational expression or a single grid, scalar, number, or expression resulting in a single grid, scalar or number.

{grid | scalar | number} - defines what the output value will be if the evaluation of the condition is FALSE. If no argument is specified, the output will receive NODATA. Unless the desired result is a grid containing all NODATA, it is advisable to specify an output for this argument.

grid - an input integer or floating-point grid, or an expression resulting in a grid.

scalar - the current value of the specified scalar variable.

number - any integer or floating-point value, or an expression resulting in a number.

CON() Function

The screenshot shows the ARC/INFO Help window with the title bar 'ARC/INFO Help'. The menu bar includes 'File', 'Edit', 'Bookmark', 'Options', and 'Help'. The toolbar contains 'Help Topics', 'Back', '<<', '>>', 'Glossary', and 'Commands'. The main content area has a yellow header with the title 'CON()' and the text 'Available at: GRID'. Below the header are three links: 'Usage', 'Notes', 'Discussion', and 'Related Topics'. The main text describes the function: 'performs one or more conditional if/else evaluations on a cell-by-cell basis within the analysis window.' The function signature is 'CON(<condition>, <true_expression>, {<condition>, <true_expression>}, ..., {<condition>, <true_expression>}, {false_expression})'. The 'Arguments' section defines: '<condition>' as any valid Boolean or relational expression; '<true_expression>' as the value or expression used to compute the output value if the condition is TRUE; and '<false_expression>' as the value or expression used to compute the output value if none of the conditions is TRUE.

CON()
Available at: GRID
[Usage](#) [Notes](#) [Discussion](#) [Related Topics](#)

performs one or more conditional if/else evaluations on a cell-by-cell basis within the analysis window.

CON(<condition>, <true_expression>, {<condition>, <true_expression>}, ..., {<condition>, <true_expression>}, {false_expression})

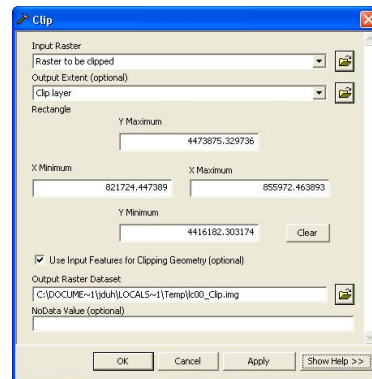
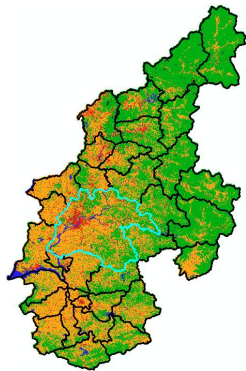
Arguments

<condition> - any valid Boolean or relational expression involving multiple grids, scalars, numbers, or expressions.

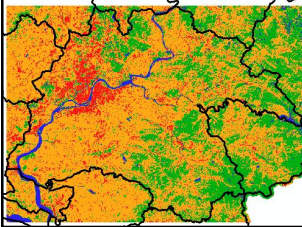
<true_expression> - the value or expression that will be used to compute the output value if the evaluation of the <condition> is TRUE. The input argument can be a grid, scalar or number, or any valid map algebra expression involving operators and functions that results in a valid input. Another CON function is valid input.

<false_expression> - the value or expression that will be used to compute the output value if none of the evaluations of the conditions is TRUE. The input argument can be a grid, scalar or number, or any valid map algebra expression involving operators and functions that results in a valid input. Another CON function is valid input.

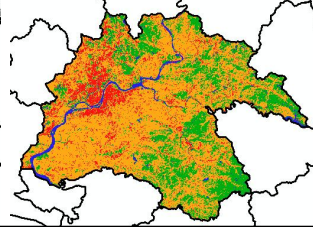
Raster Clip Example



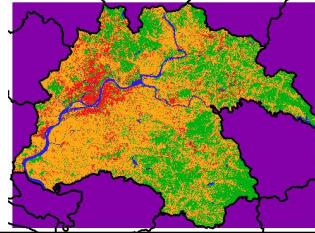
Output A



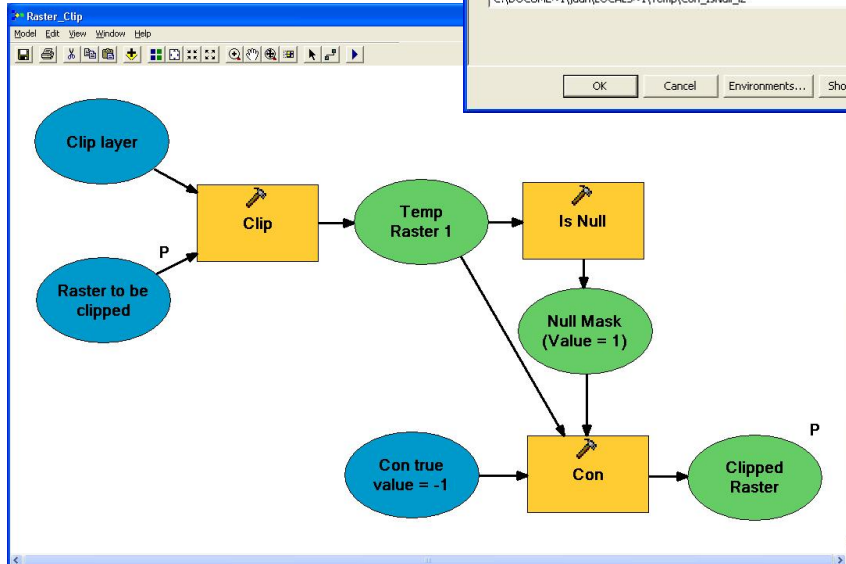
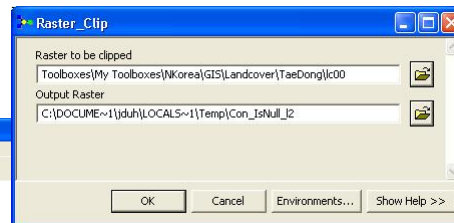
Output B

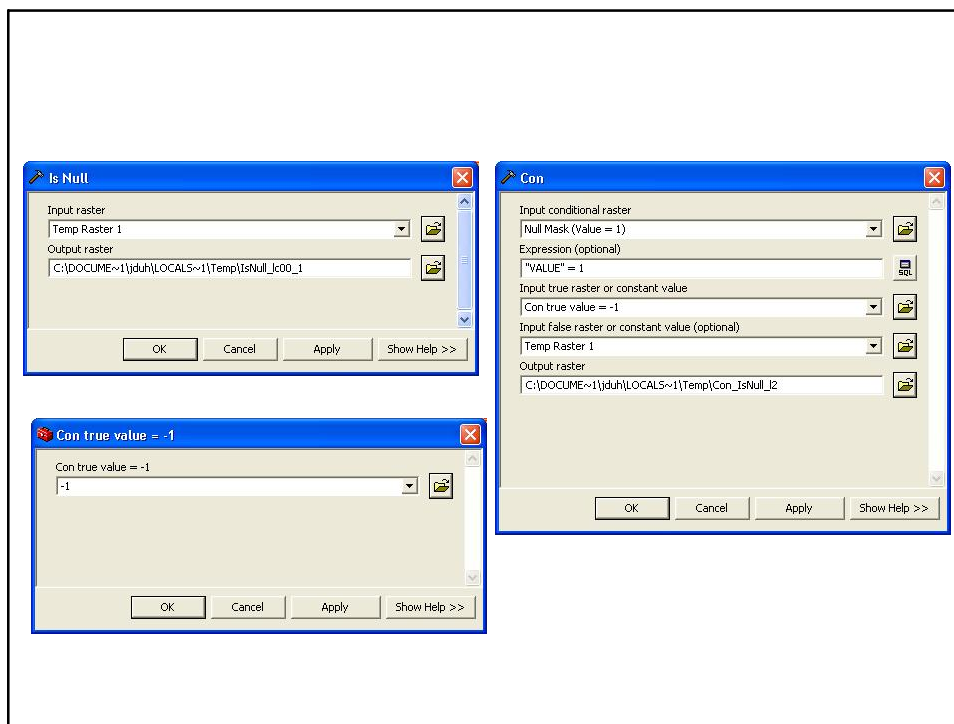


Output C

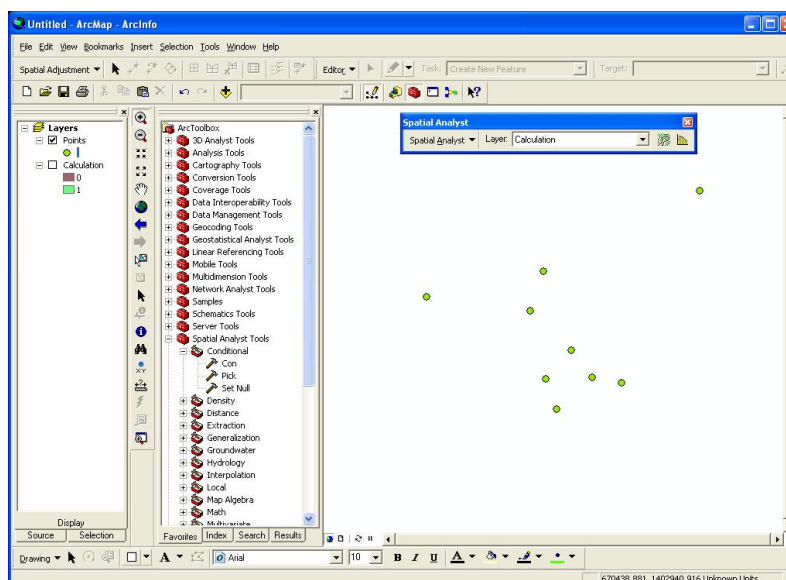


Raster Clip



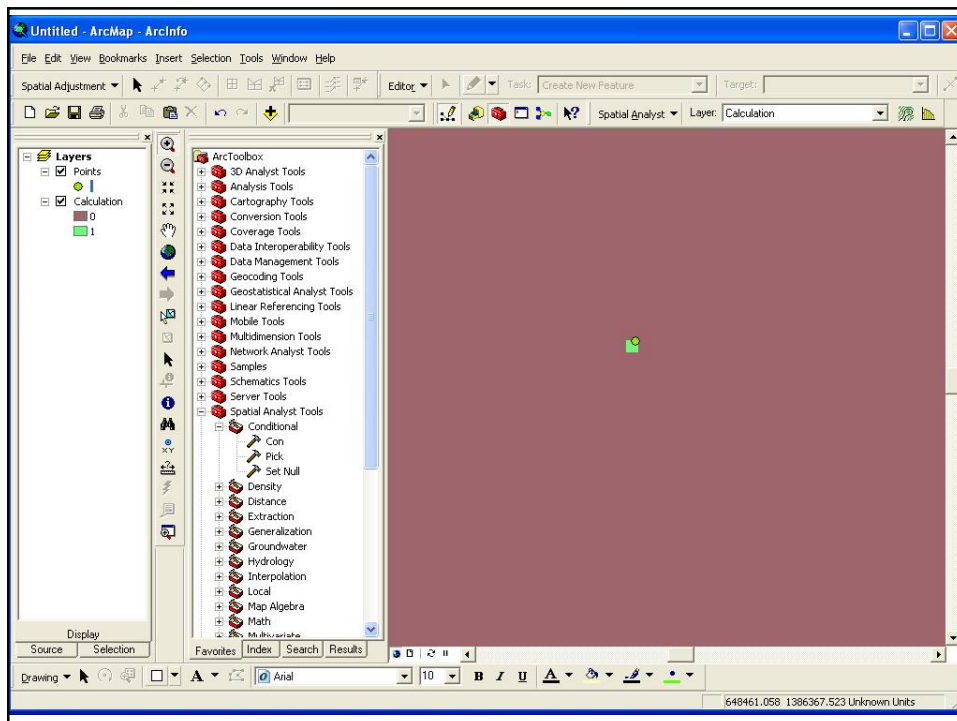
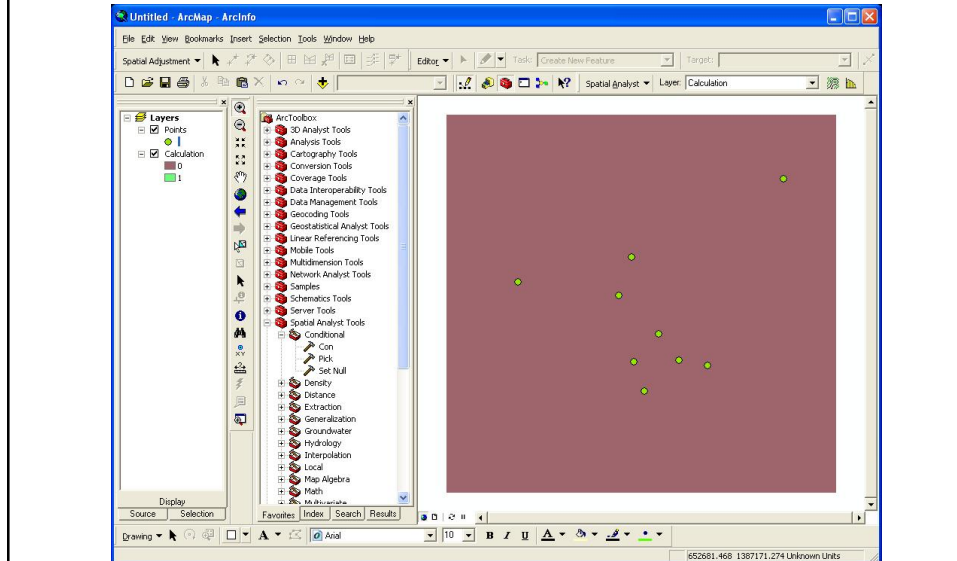


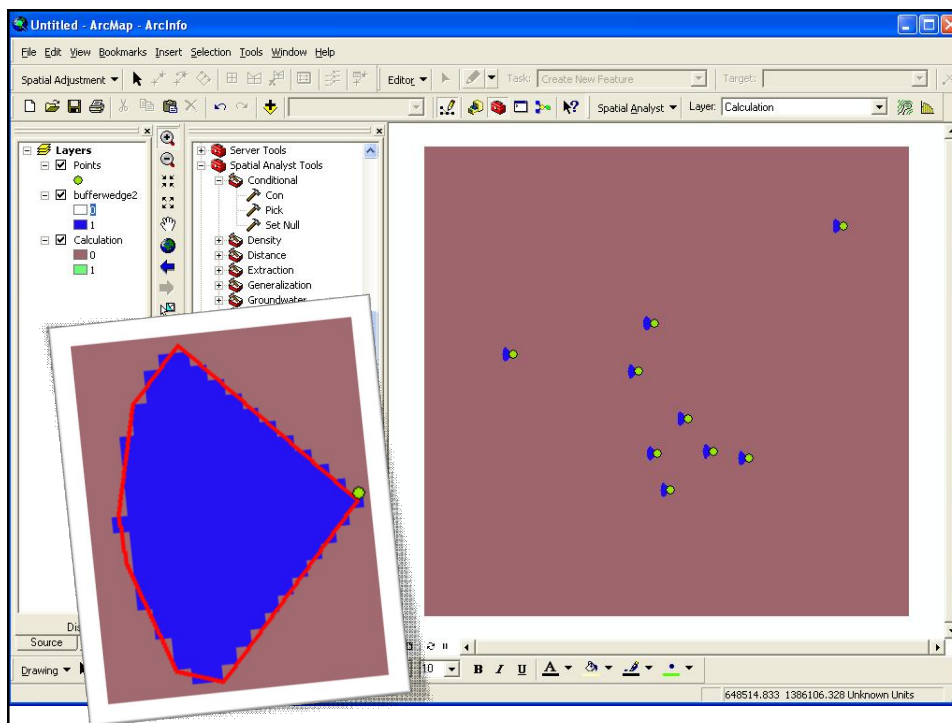
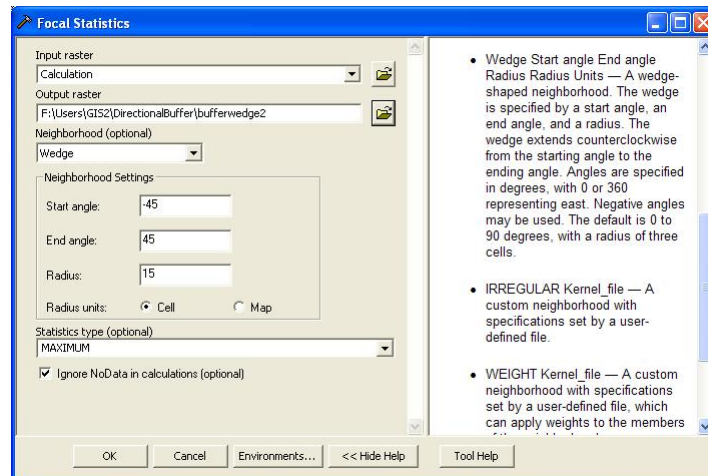
Raster Buffering



Point Features to Raster

- $\text{Con}(\text{isnull}(\text{pointtg}), 0, 1)$





Implementing Ordered Weighted Average in ArcGIS

- Raster Calculator

$r1 = \text{rank}(1, [\text{factor1}], [\text{factor2}], [\text{factor3}])$

$r2 = \text{rank}(2, [\text{factor1}], [\text{factor2}], [\text{factor3}])$

$r3 = \text{rank}(3, [\text{factor1}], [\text{factor2}], [\text{factor3}])$

$\text{owavg} = [r1] * 0.5 + [r2] * 0.3 + [r3] * 0.2$