

Cookbook 30 October 2013

Raster Data and Spatial Analyst (Part 6)

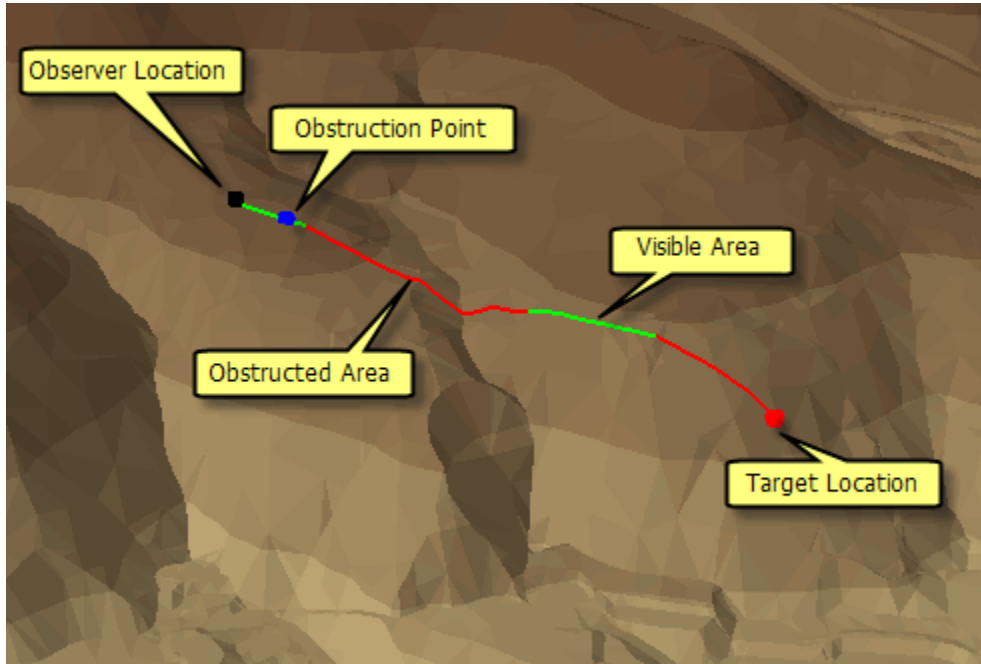
Overview

1. Viewshed and Visibility Analysis
2. Tools!
3. The Mount Tom Wind Project

<i>Week</i>	<i>Class</i>	<i>Date</i>	<i>Topic</i>	
Week 1	Class 1	9/4 (We)	A Professional Map!	
Week 2	Class 2	9/9 (Mo)	Online GIS (Part 1)	Online GIS Project
	Class 3	9/11 (We)		
Week 3	Class 4	9/16 (Mo)	Online GIS (Part 2)	
	Class 5	9/18 (We)		
Week 4	Class 6	9/23 (Mo)	GIS Analysis (Part 1)	13 Cities Project
	Class 7	9/25 (We)		
Week 5	Class 8	9/30 (Mo)	GIS Analysis (Part 2)	Site Selection Project
	No class	10/02 (We)		
Week 6	Class 9	10/07 (Mo)	GIS Analysis (Part 3)	Proximity Tuition Project
	Class 10	10/09 (We)		
Week 7	No class	10/14 (Mo)	Raster Analysis (Part 1)	
	Class 11	10/15 (Tu)		
	Class 12	10/16 (We)		
Week 8	Class 13	10/21 (Mo)	Raster Analysis (Part 2)	Solar Village Project
	Class 14	10/23 (We)		
Week 9	Class 15	10/28 (Mo)	Raster Analysis (Part 3)	Viewshed Analysis
	Class 16	10/30 (We)		
Week 10	Class 17	11/04 (Mo)	Network Analysis (Part 1)	
	Class 18	11/06 (We)		
Week 11	No class	11/11 (Mo)	Network Analysis (Part 2)	Network Project
	Class 19	11/13 (We)		
Week 12	Class 20	11/18 (Mo)	Network Analysis (Part 3)	
	Class 21	11/20 (We)		
Week 13	Class 22	11/25 (Mo)	Special Topics (Part 1)	Special Project
	No class	11/27 (We)		
Week 14	Class 23	12/02 (Mo)	Special Topics (Part 2)	
	Class 24	12/04 (We)		
Week 15	Class 25	12/09 (Mo)	Special Topics (Part 3)	
	Class 26	12/11 (We)		

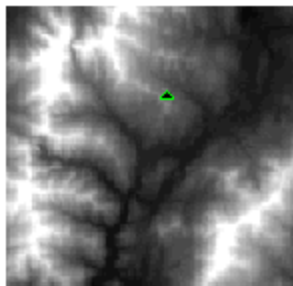
1) Viewshed and Visibility Analysis

The shape of a terrain surface dramatically affects which parts of the surface someone standing at a given point can see. What is visible from a location is an important element in determining the value of real estate, the location of telecommunications towers, or the placement of military forces.

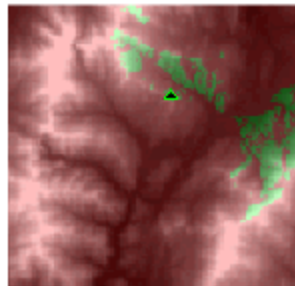


A line of sight is a line between two points that shows the parts of the surface along the line that are visible to or hidden from an observer. Creating a line of sight allows you to determine whether a given point is visible from another point.

A viewshed identifies the cells in an input raster that can be seen from one or more observation locations. Each cell in the output raster receives a value that indicates how many observer points can be seen from each location. If you have only one observer point, each cell that can see that observer point is given a value of 1. All cells that cannot see the observer point are given a value of 0. The observer points feature class can contain points or lines. The nodes and vertices of lines will be used as observation points.



Input surface with
observer point



Output viewshed

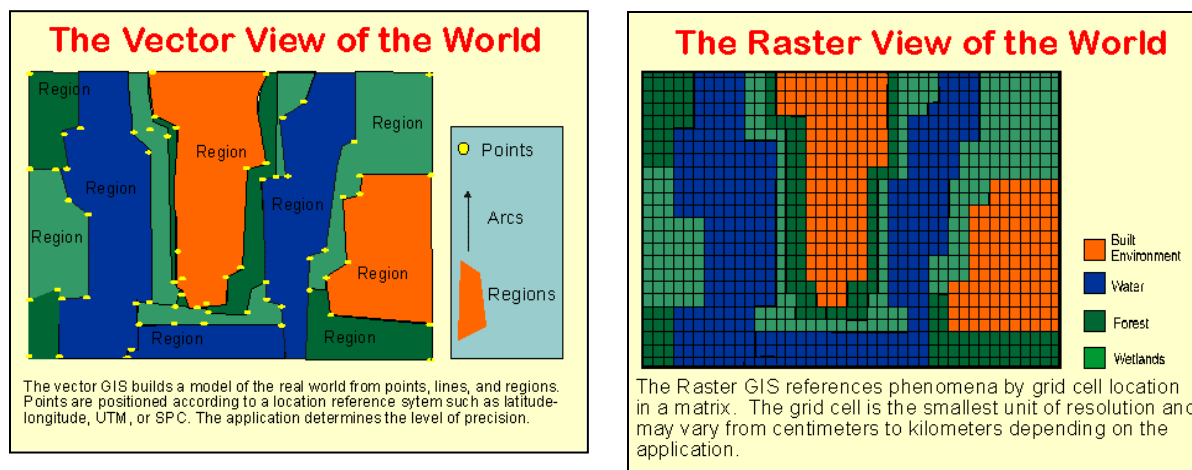
- Visibility analysis is the same thing – just at greater detail, for example inside a city or even inside a building or room.
- You can also consider the solar radiation tools we used last week as a form of visibility analysis – in this case how visible is the sun from a given point or area.

Data Requirements

1. A 3D model of reality (e.g. land surface, city, building, room, etc.).
2. One or more observer points.

2) Tools!

We can abstract reality in raster or vector format – whatever makes the most sense for a given application. Therefore we can also move back and forth between vector and raster world by converting vector to raster and vice-versa.



2.1) Vector to Raster

Here we have three main tools: Point to Raster, Polyline to Raster, and Polygon to Raster.

<http://resources.arcgis.com/en/help/main/10.1/index.html#//009t00000067000000>

More Information

- Converting features to raster data
http://resources.arcgis.com/en/help/main/10.1/index.html#/Converting_features_to_raster_data/001200000033000000/
- How Polygon To Raster works
<http://resources.arcgis.com/en/help/main/10.1/index.html#//001200000037000000>

2.2) Raster to Vector

Here we have three main tools: Raster to Point, Raster to Polyline, and Raster to Polygon.

<http://resources.arcgis.com/en/help/main/10.1/index.html#//009t00000067000000>

More Information

- About converting from raster data
http://resources.arcgis.com/en/help/main/10.1/index.html#//About_converting_from_raster_data/001200000000n0000000/
- Raster to Polygon (Conversion)
<http://resources.arcgis.com/en/help/main/10.1/index.html#//00120000000080000000>

2.3) Your Turn!

Be careful with these raster-to-vector and vector-to-raster conversion tools: they are easy to use, but you need to select the proper methods and options in order to get the output you want!

Download the 1951 – 1999 Land Use data layer for Easthampton from MassGIS and add to a map.

1. In 1999: how many acres of Easthampton were forested? _____
2. What percentage of total town area was that? _____

Now: convert the land use polygons to raster cells using the Polygon to Raster tool.

Make sure you select the *appropriate* Value field, Cell assignment type, Priority field, and Cellsize.

Remember: it is helpful to have *all* raster data you use in your analysis with the *same* cellsize!

3. What cellsize is *appropriate* here? *Why*? _____
4. Using the raster layer: how many acres were forested in 1999? _____

Now – convert the land use raster back to polygons using the Raster to Polygon tool.

5. Using vector layer: how many acres were forested in 1999? _____
6. Compare your answers from Question 1, 4, and 6!

3) The Mount Tom Wind Project

1. Create the Conceptual Flowchart to serve as the framework of your analysis and your final report. See 28 October 2013 cookbook for details.
2. Organize your project: folders and file geodatabases.
3. Define and set-up your deliverables = the map!

Recent News

<https://www.wind-watch.org/news/2012/06/02/local-officials-concerned-about-tower-farm-on-mount-tom/>

<http://www.gazettenet.com/news/4957236-95/state-tom-wind-mount>

FAA rules wind turbines on Mount Tom are a hazard to airplanes.
Federal Aviation Administration has denied two appeals but that is just part of the story. Read on.

Politically Motivated
Governor and backers are pushing for:
• An unrealistic goal of 2000 Mega watts by 2020
• Taking local turbine siting control away
• Building where not suitable

Negatives Outweigh
Turbines will *not* result in:
• Lower energy costs
• Insure predictable supply
• Create many new jobs
• Add to our taxable base

Environmental Issues
Required studies confirms:
• Negative impact on critical habitat
• No-build in wetlands
• Hazard to migrating birds
• Hazard to airplanes

Image Driven Agenda
Holyoke seen as:
• Being a carbon free energy source
• Being business friendly
• A job producer
• Enhancing the quality of life

* Statements are personal but strive for accuracy. Corrections and new facts that help create a clear picture of the wind turbine issue on Mount Tom are sought. Send comments to: nevar13@comcast.net • 413-532-4464

Explore Mount Tom
Holyoke, MA