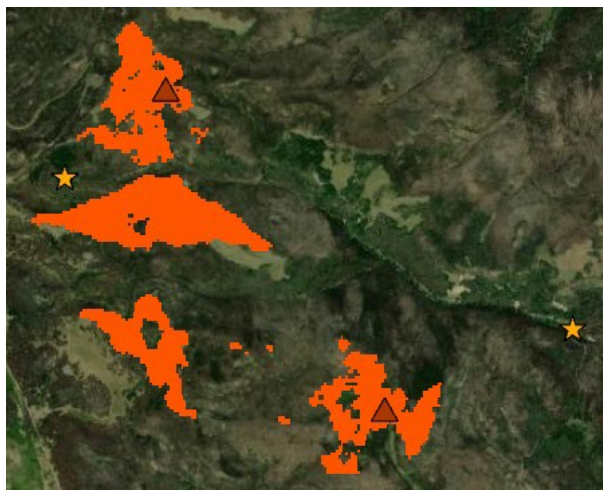


EXERCISE

Viewshed Raster Function



Introduction

Viewshed determines locations on a raster surface visible to observer features. The input surface raster is usually a DEM or DSM. The viewshed raster function is a global function, unlike local raster function which process at the display resolution, it processes pixels at the source resolution and processes the entire extent. This takes longer than local raster functions but is often still faster than geoprocessing.

In this exercise we will use the Viewshed Function to evaluate locations for a potential picnic site to ensure that it is not visible from facility buildings. We will use a shapefile of facilities locations and a shapefile with two potential picnic site locations. We will compare the results with the potential picnic site locations to see if any of the buildings are visible from a given site.

Objectives

- Learn how to use the viewshed function

Required Data

- **BH_Facilities.shp** – shapefile with two facilities we don't want to see from picnic sites
- **BH_PicnicPotential.shp** – shapefile of two potential picnic sites
- **BH_Fire_DEM_Clip.tif** – DEM we will use to run the viewshed

Prerequisites

- Install Esri ArcGIS Pro on computer
- Spatial Analyst Extension



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Part 1: Set up ArcGIS Pro

Open Pro and load the data for this exercise. You can also insert another map if you already have a project going (Insert tab, Project group, New Map).

A. Launch Pro and load the AOI

1. Launch Pro from the start menu by clicking **Start, Programs, ArcGIS Pro**
2. Click the **Add Data** button and navigate to where you placed the course material.
3. In the Viewshed_Exercise folder Select **BH_Facilities.shp**, **BH_PicnicPotential.shp**, **BH_Fire_DEM_Clippped.tif** and click **Add**.

B. Change Basemap

1. Click **Map** tab, in the **Layer** group, select **Imagery**

Part 2: Viewshed Function

We will run the viewshed function as if we were looking onto the landscape from the top of the facility buildings. We are wondering what areas can be seen from a facility building that is 3 meters high. Then we will compare the results to the potential picnic sites.

A. Run Viewshed Function

1. Open the **Raster Function** pane in the Imagery tab, Analysis Group then search for **Viewshed**
2. In Parameters under **Raster** select the **BH_Fire_DEM_Clippped.tif** from the dropdown
3. Under **Observer Features** select the **BH_Facilities.shp** from the dropdown
4. Expand **Viewshed Parameters** select **All Sightlines** under **Analysis Method**
5. Under **Analysis Type** select **Frequency**
6. Leave other parameters as the default.

Note: All sightlines perform the analysis on every pixel in the surface raster. The other option, Perimeter Sightlines, give you sightlines that are only performed on the perimeter of visible areas, this method is faster but less accurate.

Note: There are two ways to use the viewshed function which is chosen under Analysis Type. First option is Frequency, tells you what raster pixels are visible from your points. The second, Observers, produces a color classified layer that tells you which observation point is visible from the raster surface.

7. **Expand** the Observer Parameters
8. Set **Observer Offset to 3 m Linear Unit**. This adds three meters to the elevation of the observer points. In this case the facilities we want to avoid seeing are about 3 m tall or three meters above the DEM elevation.
9. Leave all others as **default**.

Note: Inner radius says any surfaces closer than this number are considered not visible. Outer radius means the surface farther than this are considered not visible.

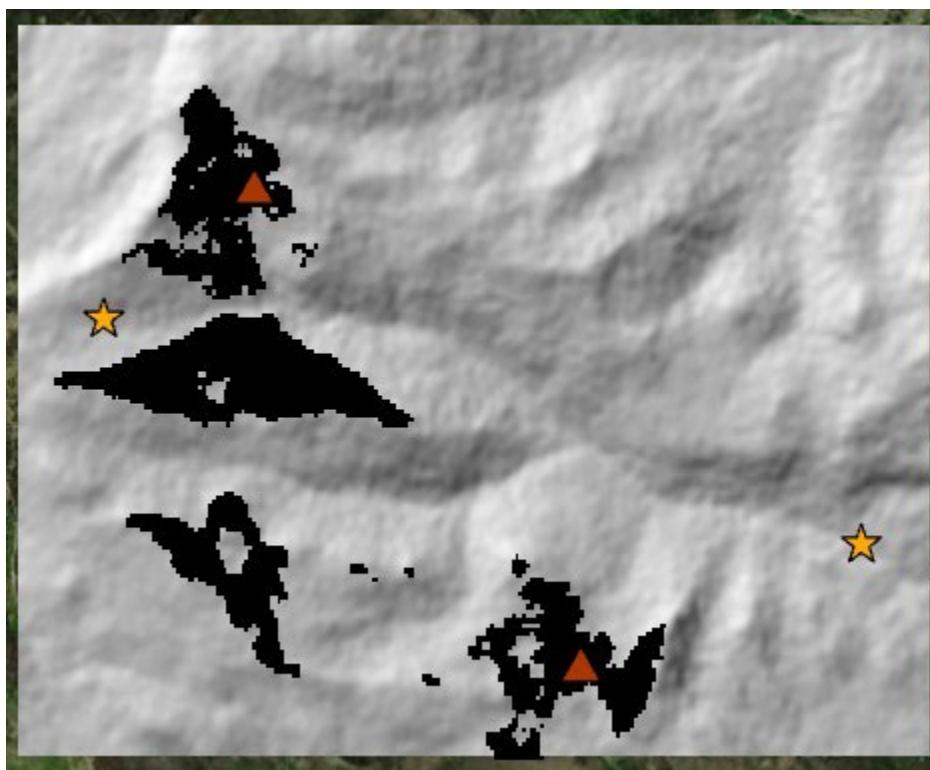
10. Click Create New Layer

11. Inspect your results! See which areas would be able to see a the 3-meter tall facility buildings. From our results we can see that either location would work because the facilities are not visible from either of location. However, the one on the east of our area is further away.

B. Add Hillshade

Let's quickly apply the hillshade function to our DEM to better visualize the topography of the landscape.

1. In the Raster Functions Pane search Hillshade
2. Select BH_Fire_DEM_Clippped.tif for the Raster
3. Keep the rest as the default
4. Click Create New Layer
5. Move this layer below your viewshed output and look at your results again. Now that we can see the slopes of the landscape a bit better our viewshed output is easier to interpret.



Congratulations! You have successfully completed this exercise. You now know the basics of using Viewshed. There are many ways you can use this function such as planning for UAS flight, recreation planning, or habitat analysis. You also learned how to apply a hillshade to a DEM using a raster function. Remember none of these layers are permanent unless you Save As instead of Create New Layer.