

Basic Raster Operations



ISTANBUL **TECHNICAL** UNIVERSITY

Sp. Anly. and Alg. in GIS

Week 2

Res. Assist. Ömer AKIN

Introduction & Aim of the Study

- *Determine the probable nesting locations of Siberian goose in the Istanbul's European Side. Siberian goose is a rare bird type that is thought to make its nests on gentle or moderate slope areas near the sea.*

Aim of the Study:

- *Find the available nesting locations of Siberian goose by considering the followings:*
 - *1000 km near the sea*
 - *Gentle or moderate slope areas*
 - *NE direction of aspect*

Input Data:

- *Land cover/use map of a part in the European side of Istanbul (Raster/img)*
- *Digital Elevation Model (Raster/img)*

Exploring Data



lab2 - QGIS

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh MMQGIS Processing Help

Drag landuse.img, ist_dem.img to the QGIS Layers window.

Layers Panel

- landuse
- ist_dem

Browser Panel

- Favorites
- C:\Users\OmrAkn\Desktop
- C:\Users\OmrAkn\Documents
- C:\Users\OmrAkn\Downloads
- C:\Users\OmrAkn\Dropbox\GISAlg2020
- D:\T\Shawn\OneDrive - itu.edu.tr\Jobs\TU
- D:\T\Shawn\OneDrive - itu.edu.tr\Univers
- D:\T\Shawn\OneDrive - itu.edu.tr\Veriler
- Spatial Bookmarks
- Home
- C:\
- D:\
- GeoPackage
- Spatialite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles
- OpenStreetMap
- WCS
- WFS
- OWS
- ArcGisMapServer
- ArcGisFeatureServer

Processing Toolbox

- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation

Coordinate: 410751,4550692 Scale: 1:113829 Magnifier: 100% Rotation: 0.0° Render USER:100026

Data Properties



Layer Properties — ist_dem — Information

Information

Source
Symbology
Transparency
Histogram
Rendering
Temporal
Pyramids
Metadata
Legend
QGIS Server

Information from provider

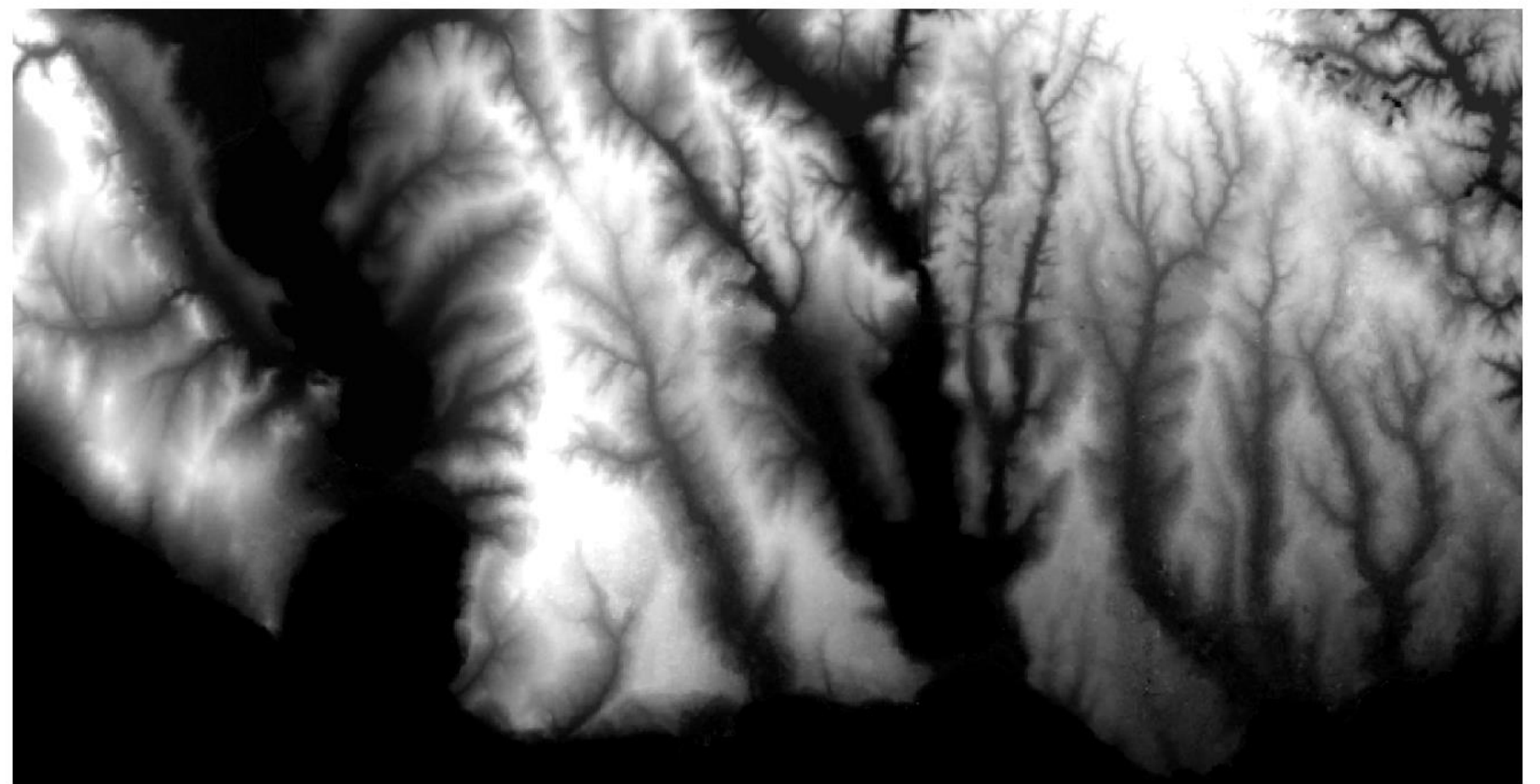
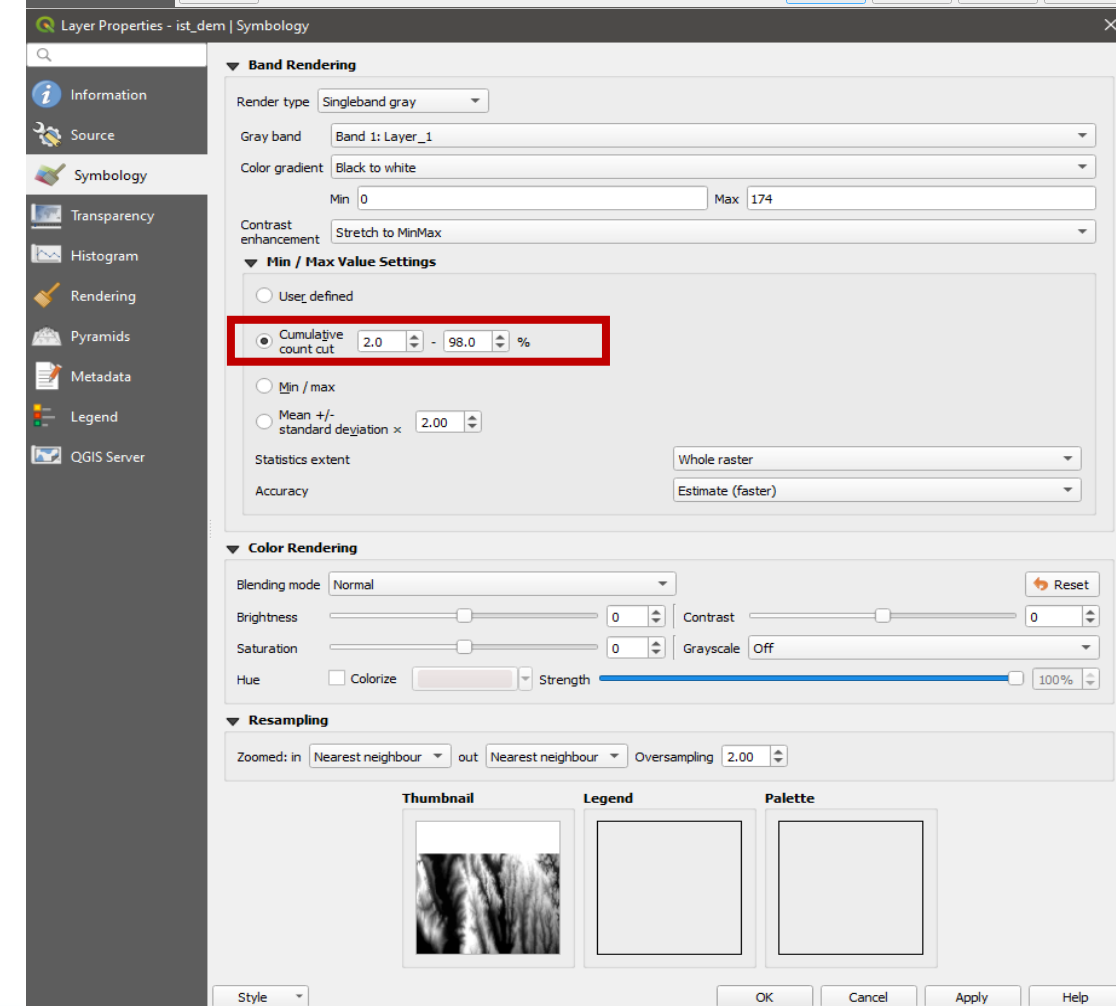
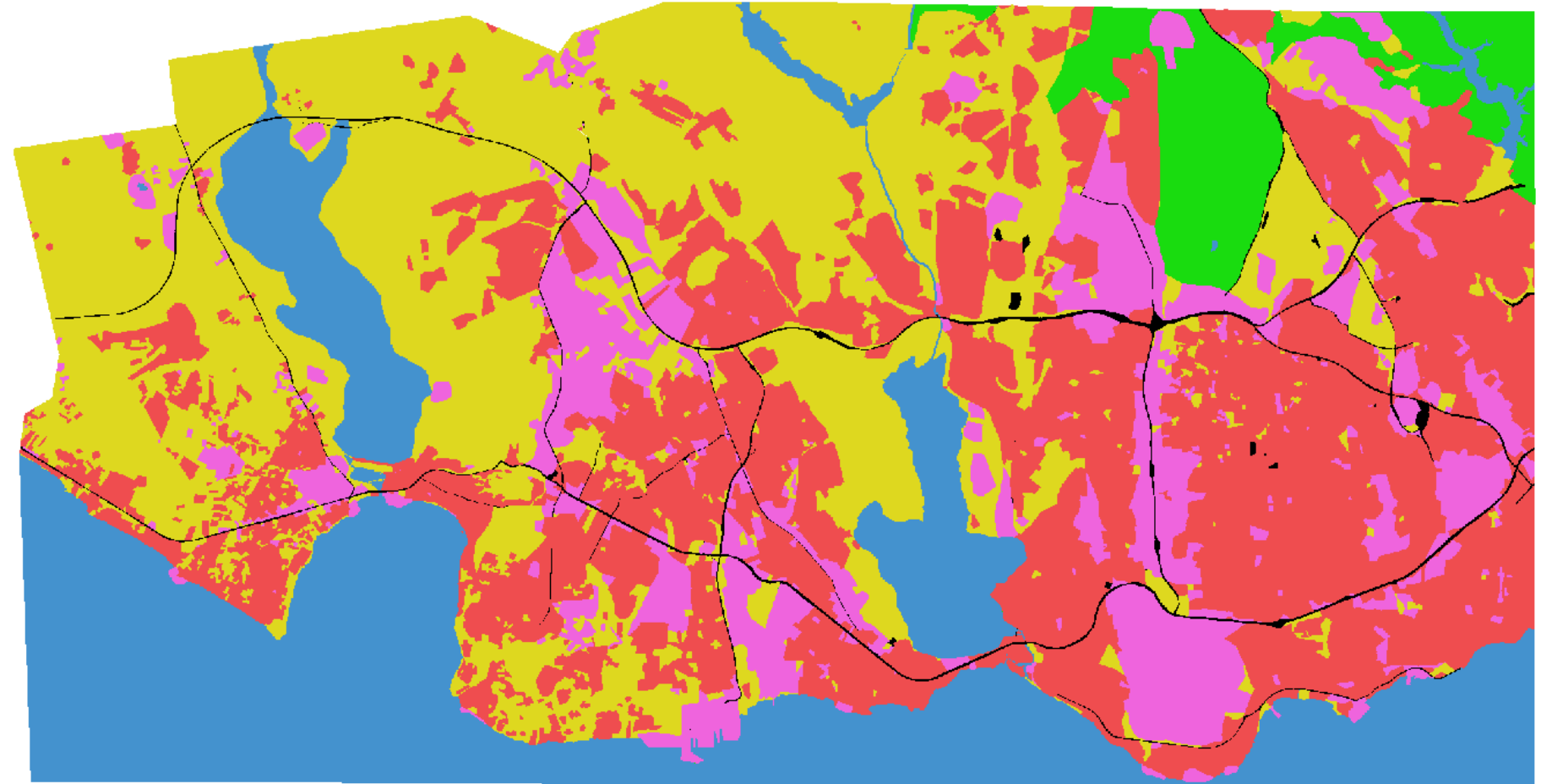
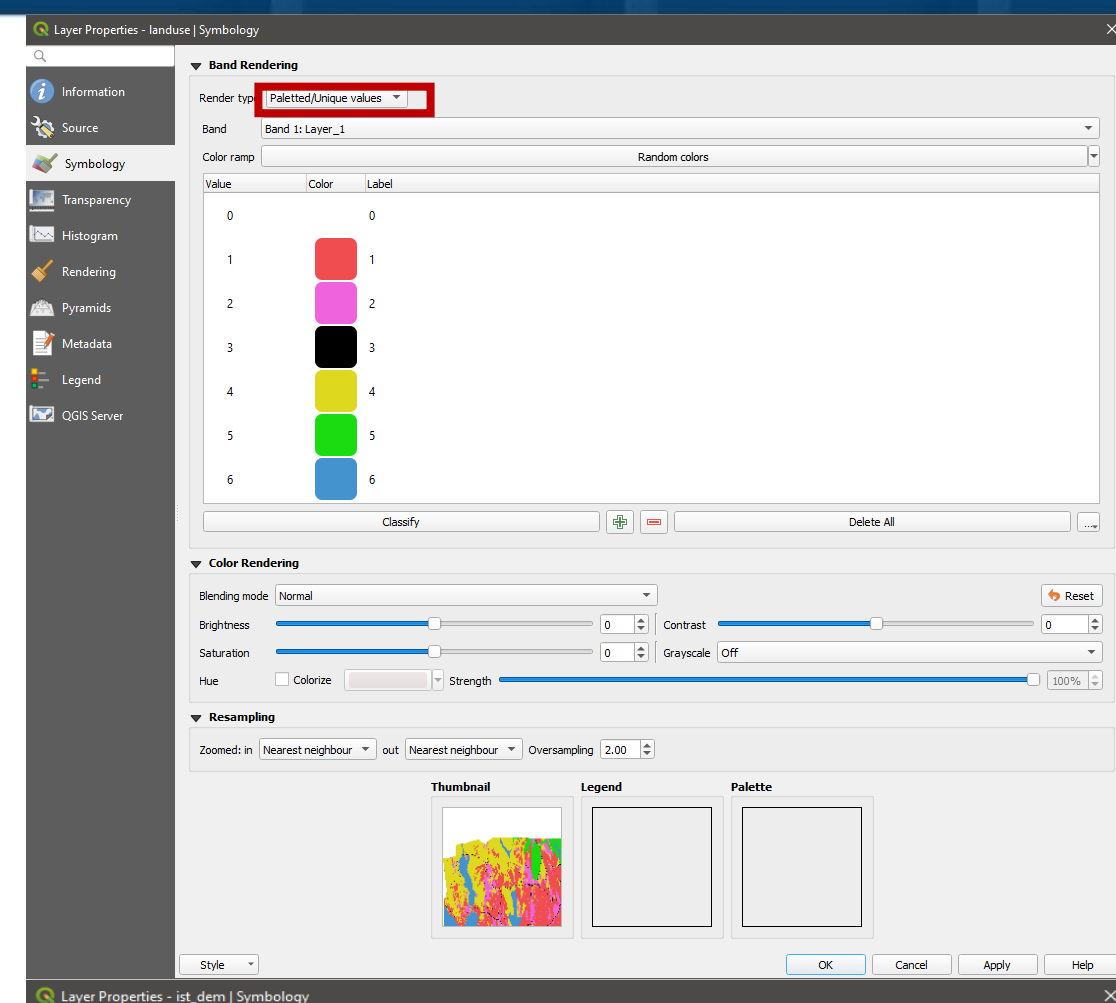
Name	ist_dem
Path	
CRS	WGS_1984_Transverse_Mercator - Projected Coordinate System
Extent	370361.0000000000000000,4536015.0000000000000000 : 410001.0000000000000000,4556455.0000000000000000
Unit	meters
Width	1982
Height	1022
Data type	UInt32 - Thirty two bit unsigned integer
GDAL Driver Description	HFA
GDAL Driver Metadata	Erdas Imagine Images (.img) Format
Dataset Description	
Compression	
Band 1	<ul style="list-style-type: none">LAYER_TYPE=athematicSourceBandIndex=0STATISTICS_APPROXIMATE=YESSTATISTICS_MAXIMUM=230STATISTICS_MEAN=64.647114415323STATISTICS_MINIMUM=0STATISTICS_STDDEV=55.965348586688STATISTICS_VALID_PERCENT=100
More information	<ul style="list-style-type: none">DataType=GenericX : 991Y : 511X : 496Y : 256X : 248Y : 128
Dimensions	X: 1982 Y: 1022 Bands: 1
Origin	370361,4.55646e+06
Pixel Size	20,-20 Spatial Resolution

Available Raster Data Exchange Formats in QGIS

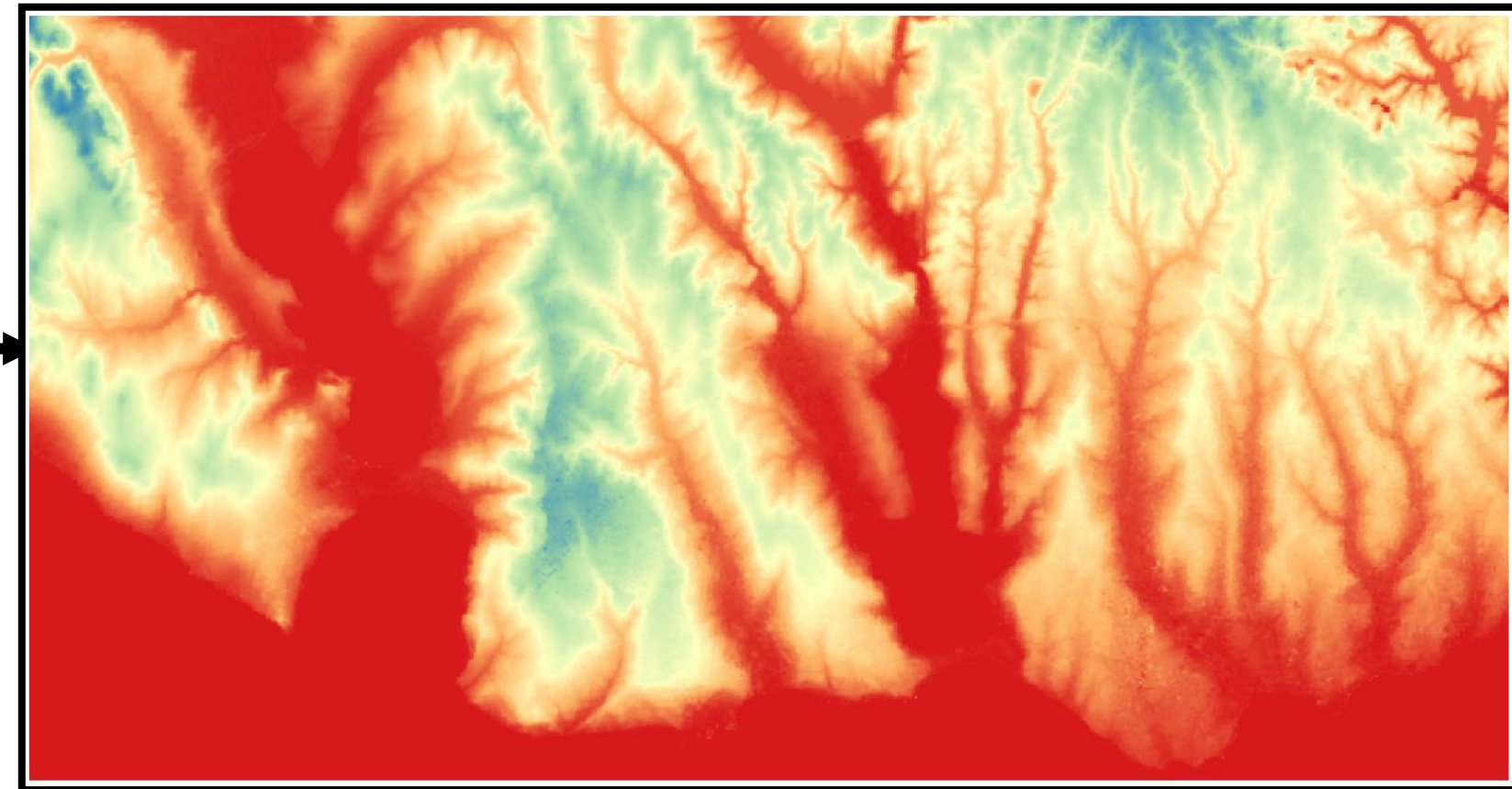
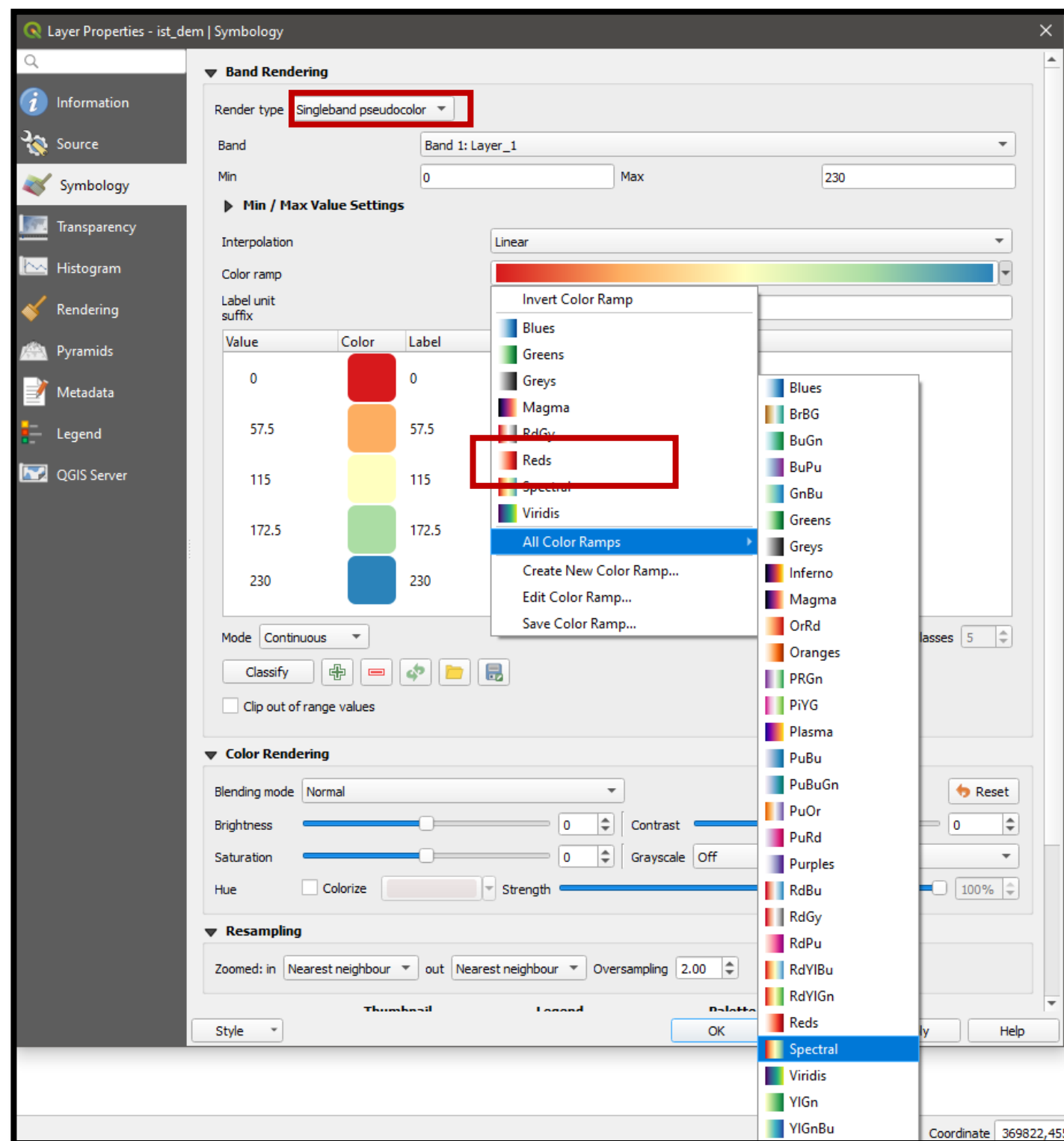


- ArcInfo ASCII Grid (.asc)
- Erdas Imagine (.img)
- GeoTIFF (.tif/.tiff)
- JPEG/JPEG-2000 (.jpg/.jpeg/.jp2/.j2k)
- Portable Network Graphics (.png)
- RasterLite (.sqlite)
- USGS Optional ASCII DEM (.dem)

Setting up Sembologies

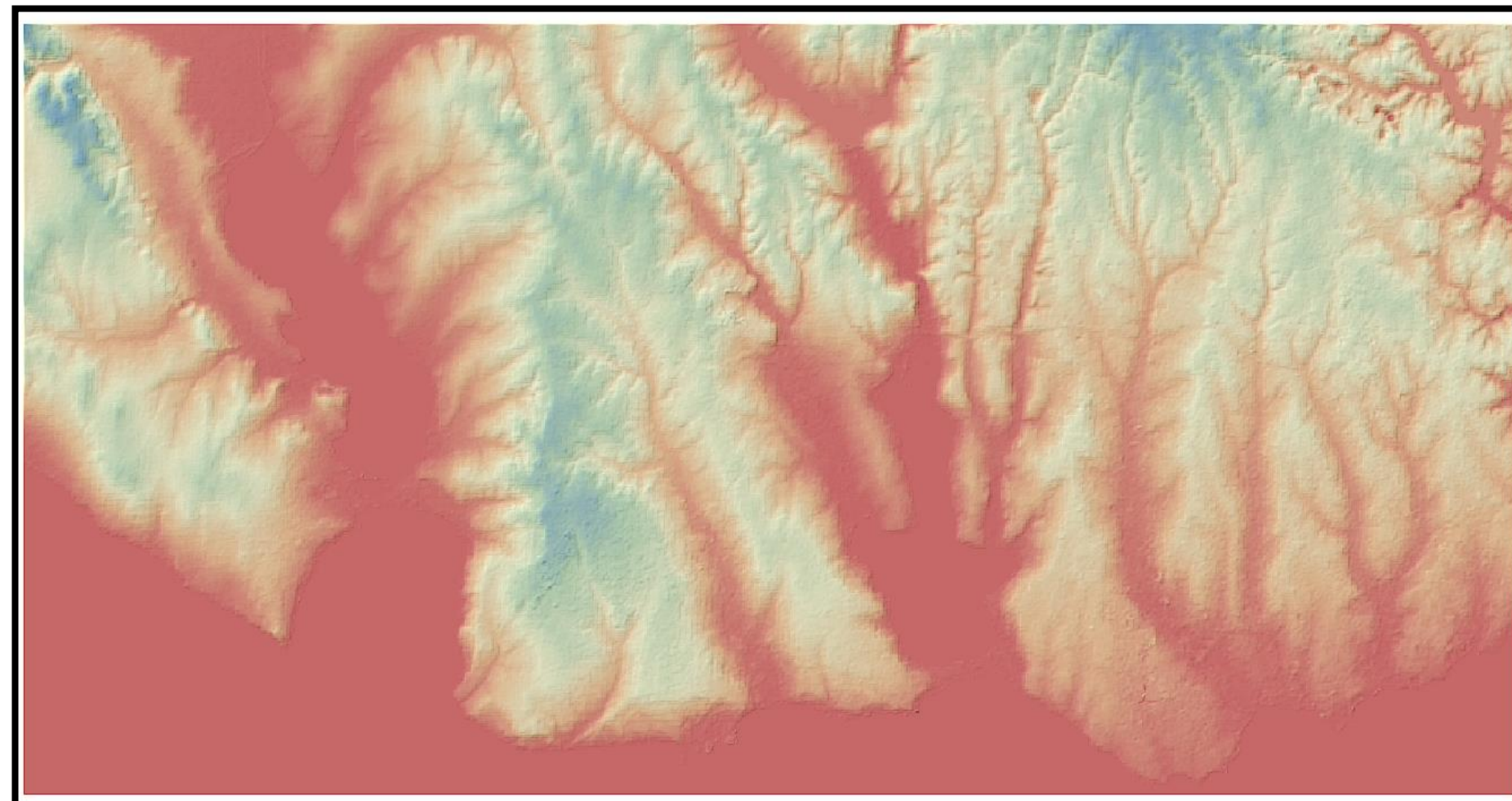
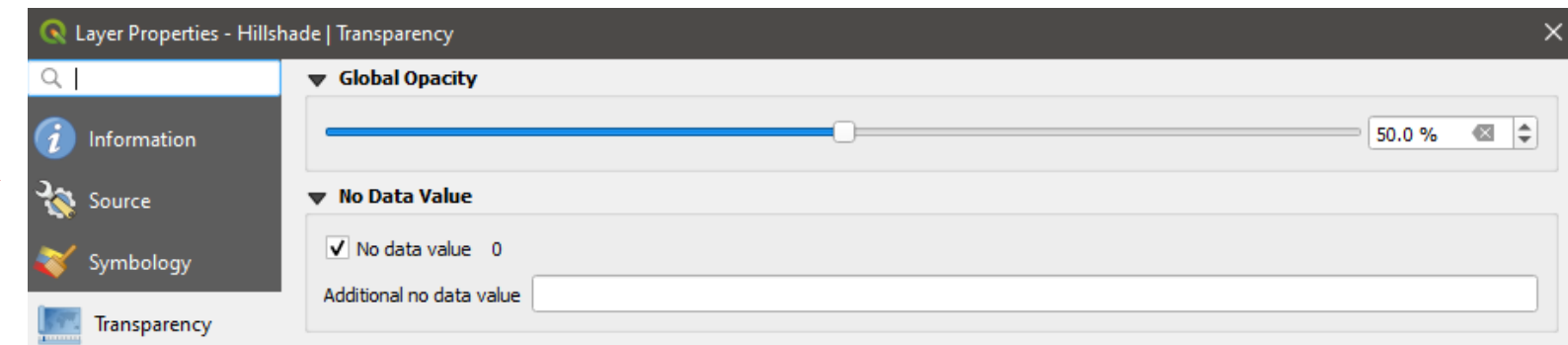
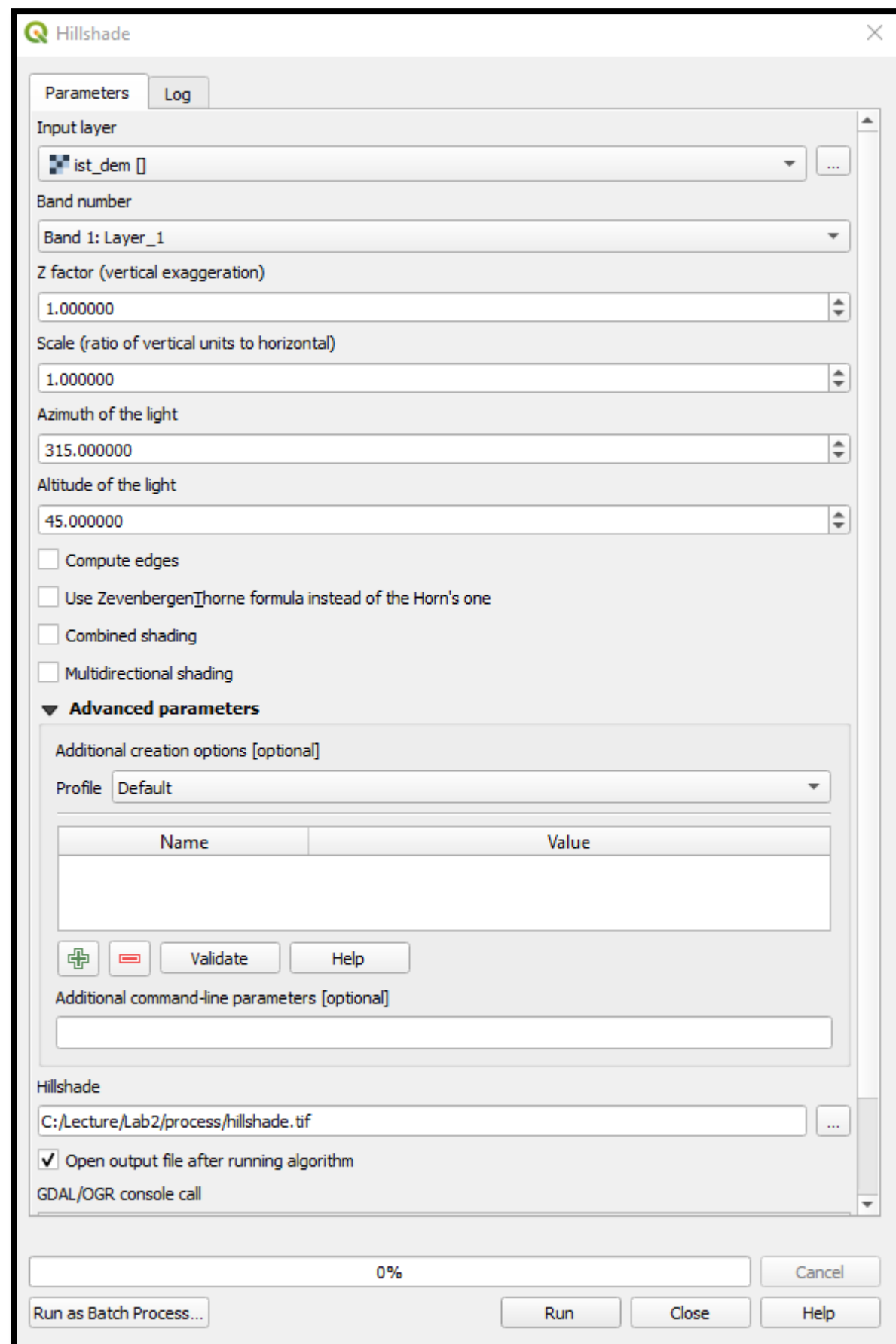


Advanced Symbology for DEM

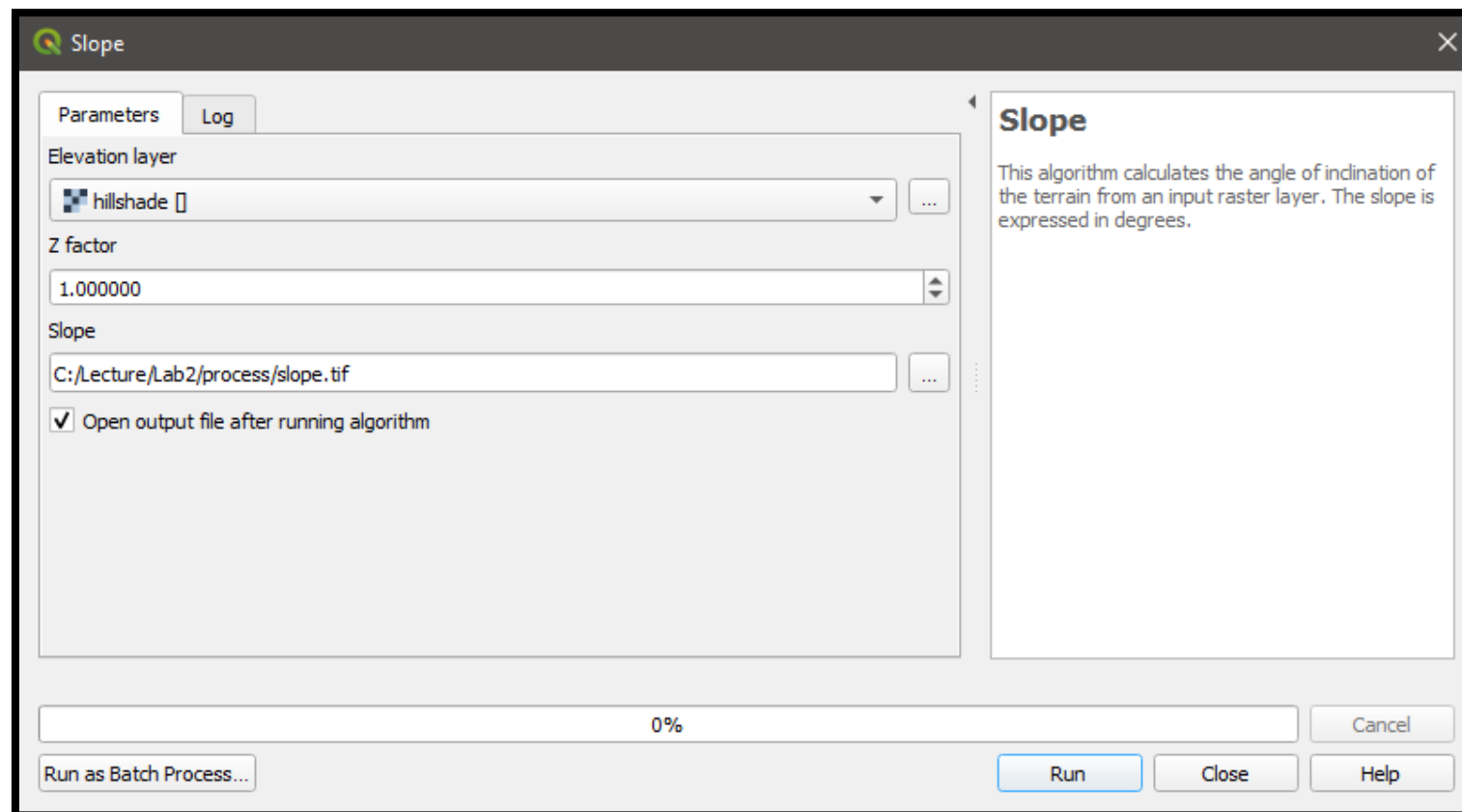


Hillshade Analysis

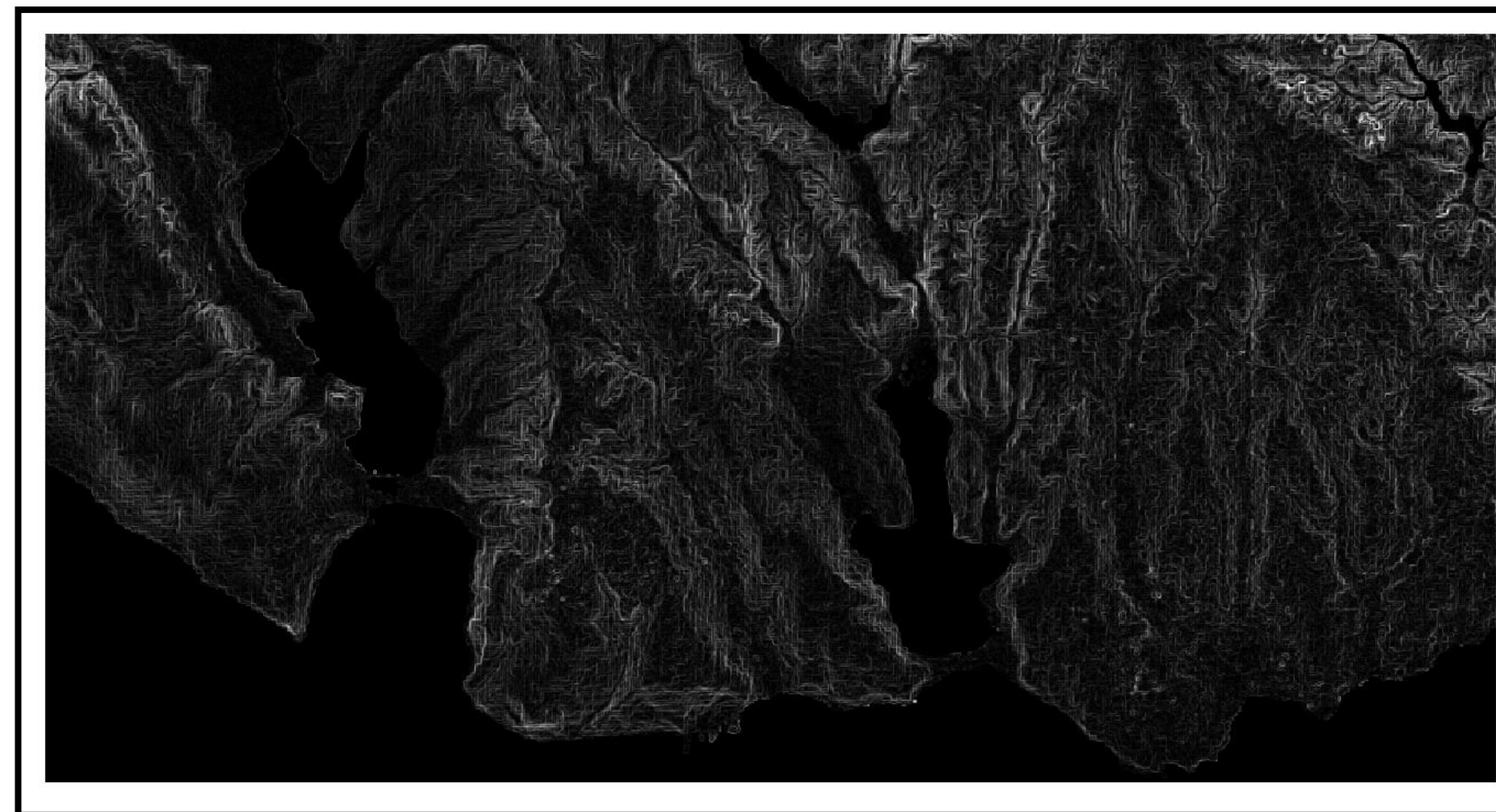
- Create a hillshade effect for DEM



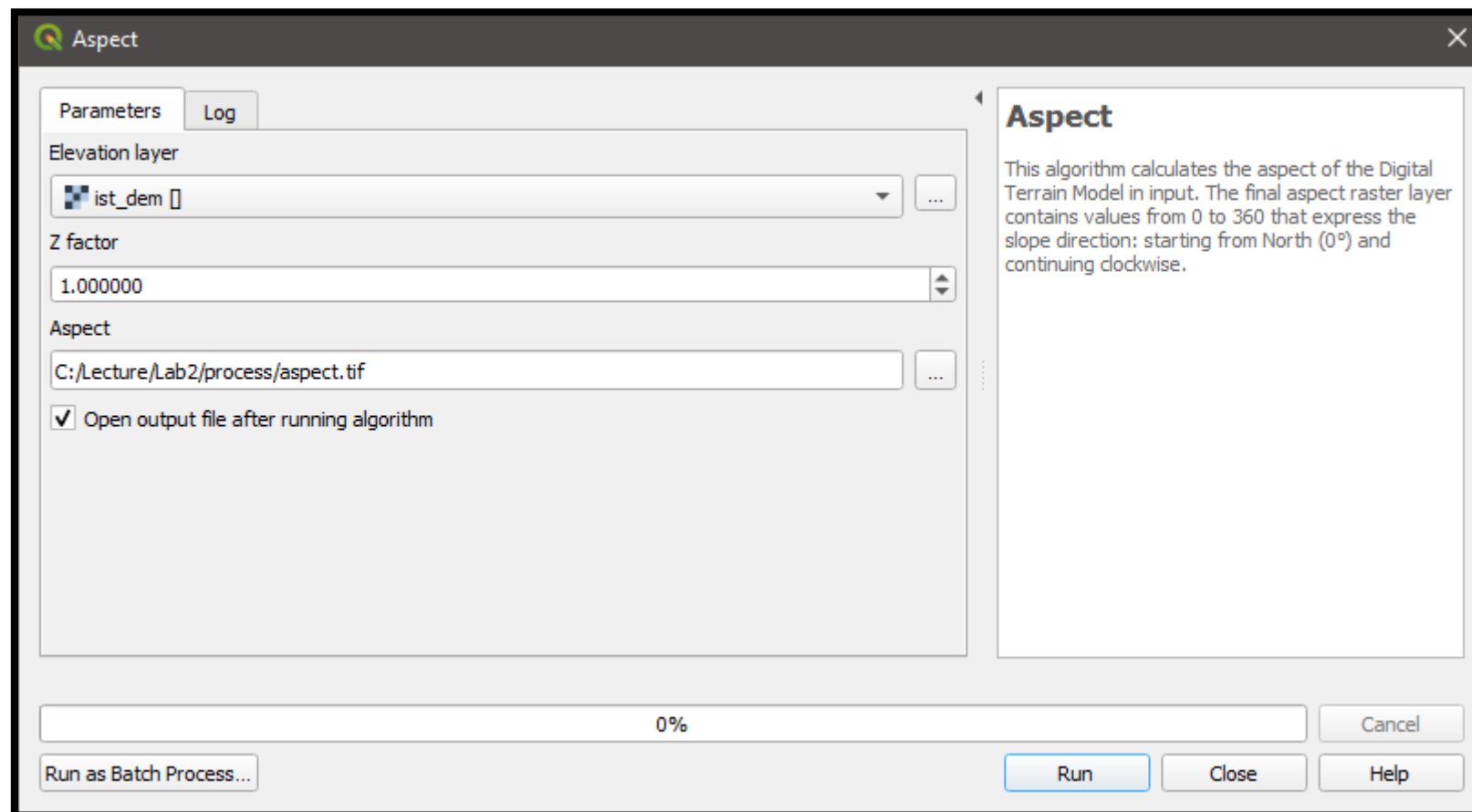
Slope Analysis



Slope (%)	Approx. Degrees	Terminology
0.0–0.5	0.0	Level
0.5–2.0	0.3–1.1	Nearly level
2.0–5.0	1.1–3.0	Very gentle slope
5.0–9.0	3.0–5.0	Gentle slope
9.0–15.0	5.0–8.5	Moderate slope
15.0–30.0	8.5–16.5	Strong slope
30.0–45.0	16.5–24.0	Very strong slope
45.0–70.0	24.0–35.0	Extreme slope
70.0–100.0	35.0–45.0	Steep slope
> 100.0	> 45.0	Very steep slope

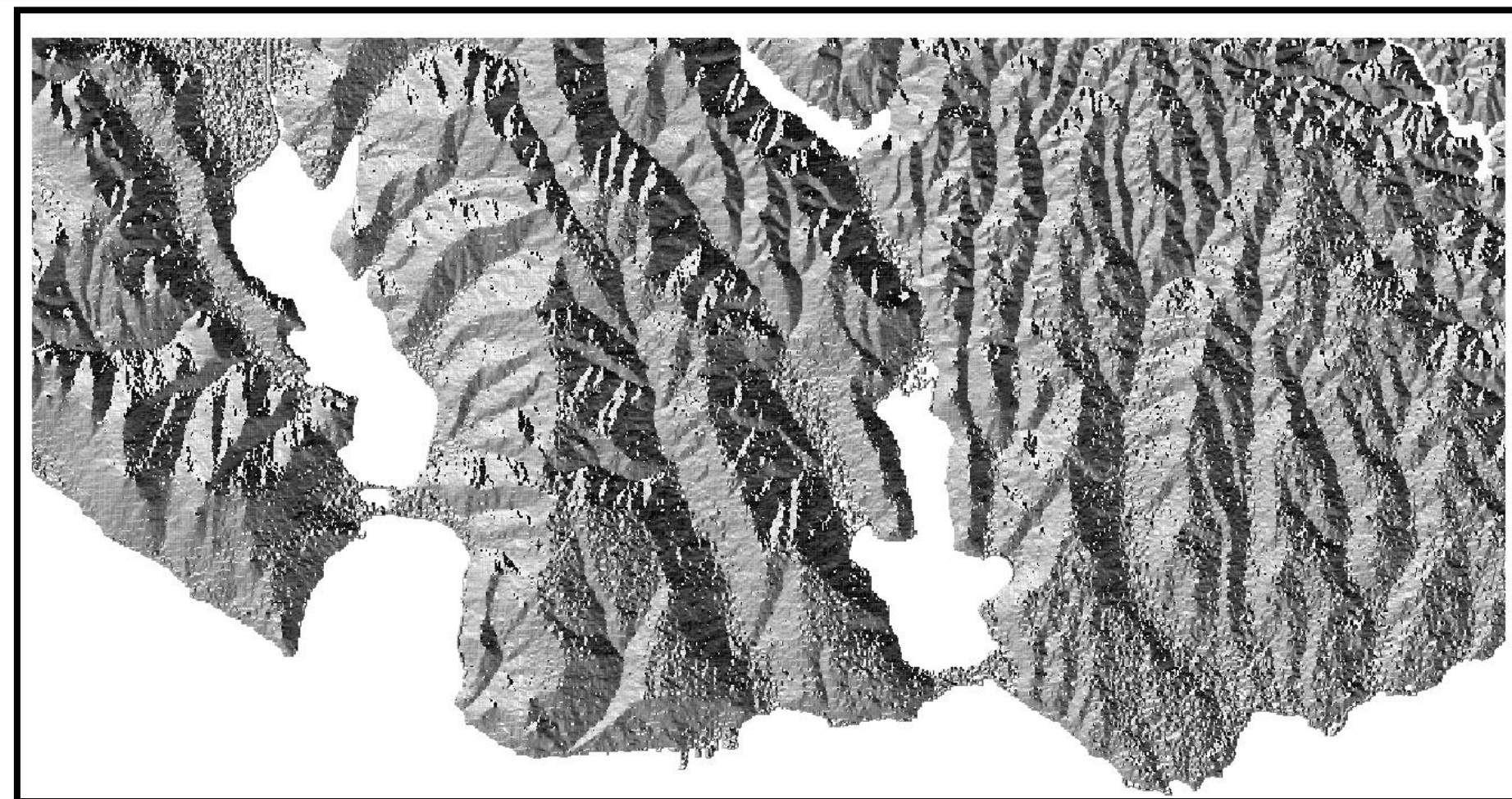
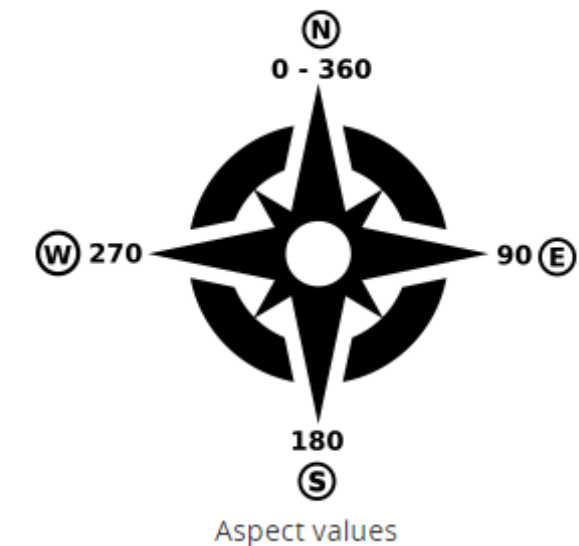


Aspect Analysis

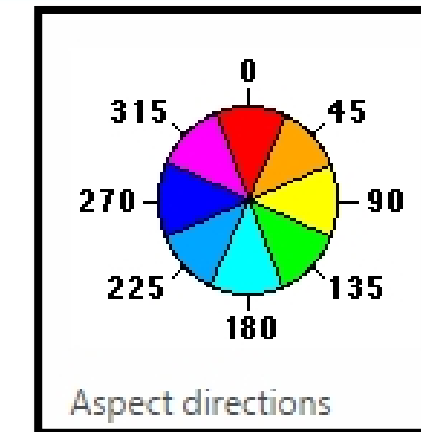
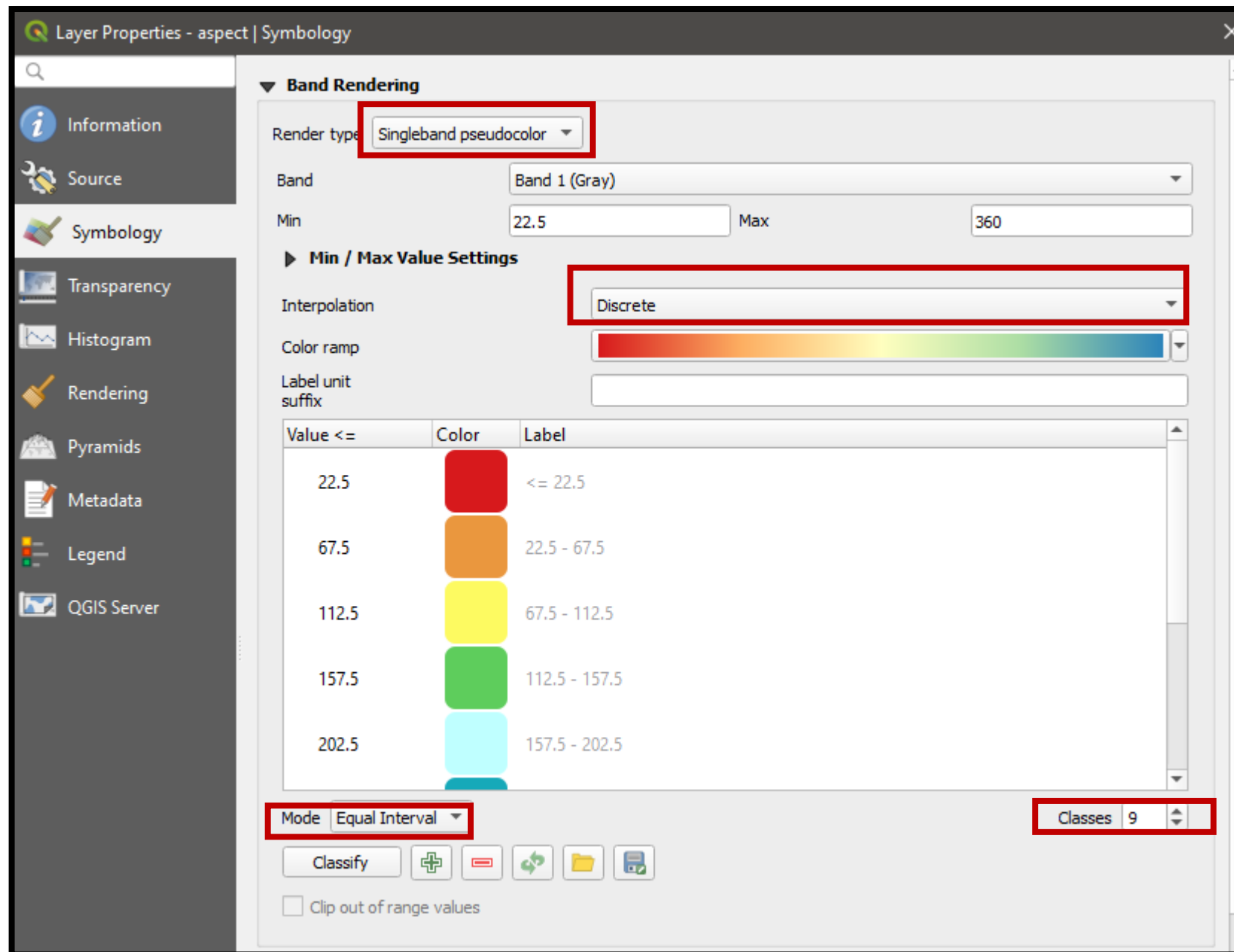


Aspect

Calculates the aspect of the Digital Terrain Model in input. The final aspect raster layer contains values from 0 to 360 that express the slope direction: starting from North (0°) and continuing clockwise.



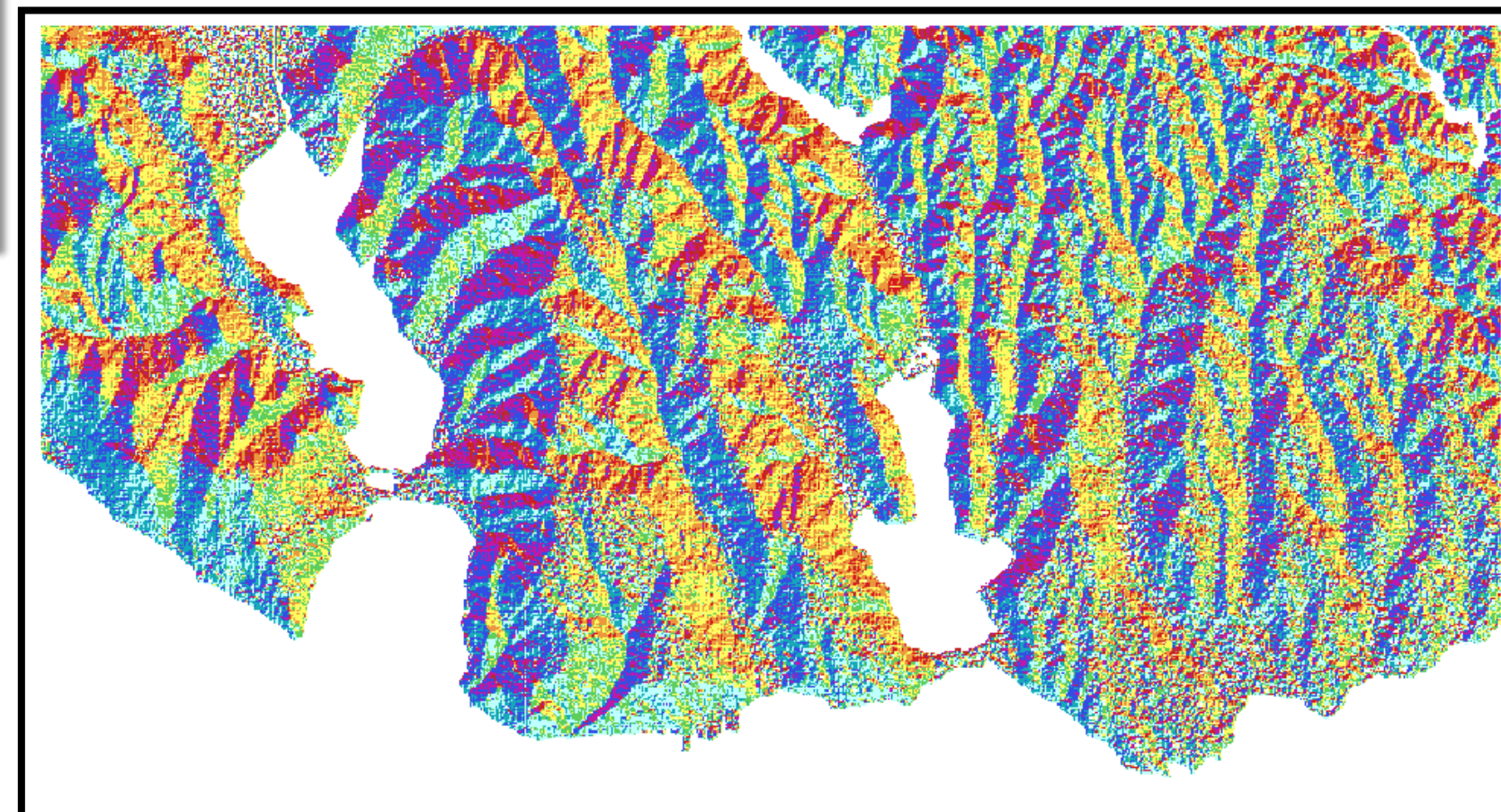
Aspect Symbology



Value <=	Color	Label
22.5	[Red]	N
67.5	[Orange]	NE
112.5	[Yellow]	E
157.5	[Light Green]	SE
202.5	[Green]	S

Value <=	Color	Label
202.5	[Yellow]	S
247.5	[Light Green]	SW
292.5	[Green]	W
337.5	[Teal]	NW
360	[Blue]	N

Labeling



Value <=	Color	Label
202.5	[Cyan]	157.5 - 202.5
247.5	[Teal]	202.5 - 247.5
292.5	[Blue]	247.5 - 292.5
337.5	[Purple]	292.5 - 337.5
360	[Red]	337.5 - 360

Extracting Water Bodies

Raster Calculator

Parameters Log

Expression

Layers

- aspect@1
- hillshade@1
- ist_dem@1
- landuse@1
- slope@1
- water_bod

Operators

+ * cos sin log10 AND

- / acos asin ln OR

^ sqrt tan atan ()

< > = != <= >=

Expression

"landuse@1" = 6

Predefined expressions

NDVI Add... Save...

Reference layer(s) (used for automated extent, cellsize, and CRS) [optional]

1 elements selected

Cell size (use 0 or empty to set it automatically) [optional]

0.000000

Output extent (xmin, xmax, ymin, ymax) [optional]

[Leave blank to use min covering extent]

Output CRS [optional]

Output

C:/Lecture/Lab2/process/water_bodies.tif

☒ Open output file after running algorithm

0%

Run as Batch Process... Run Close Help

Multiple selection

☐ aspect []

☐ hillshade []

☐ ist_dem []

☒ landuse []

☐ slope []

Select All

Clear Selection

Toggle Selection

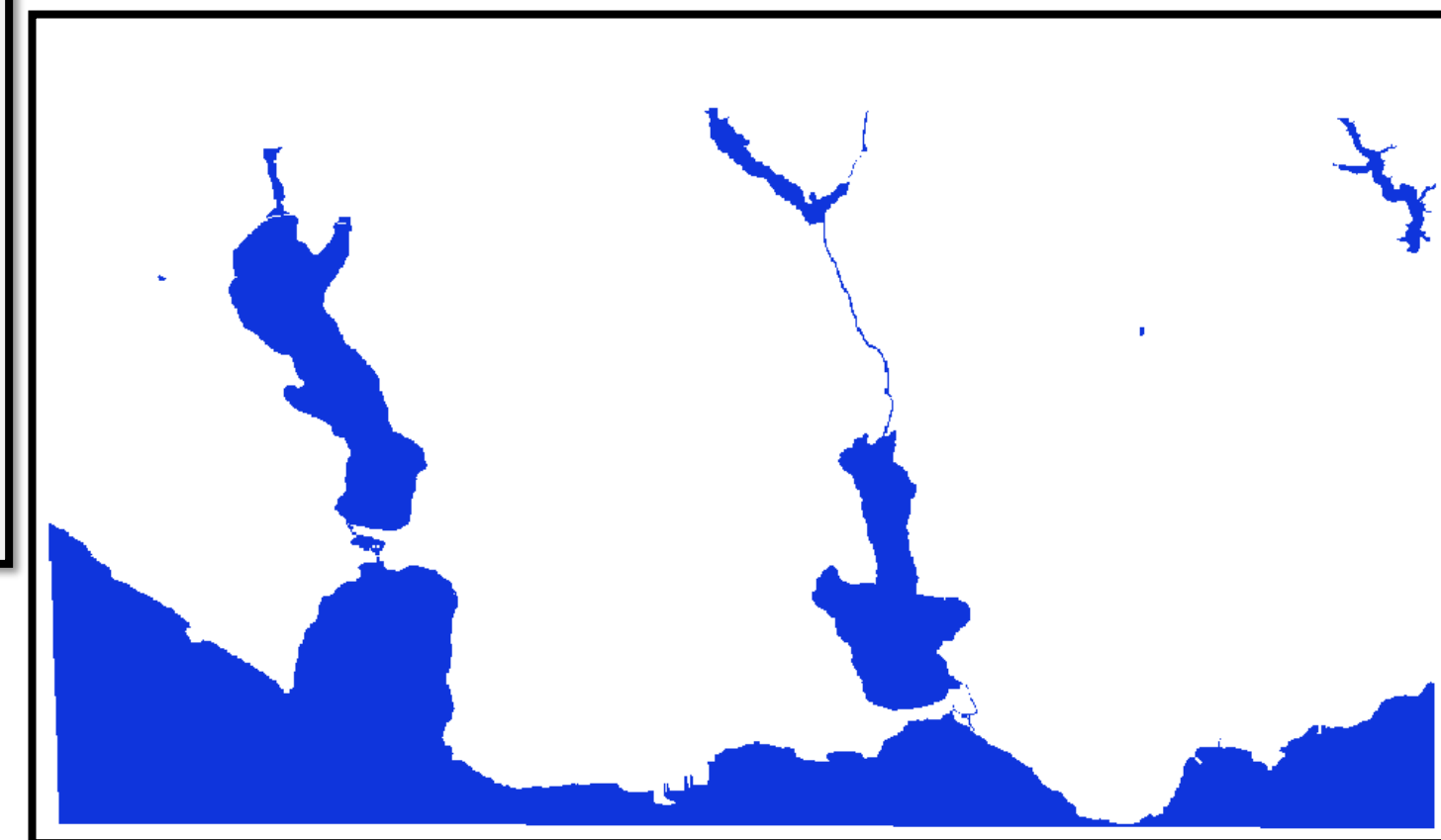
Add File(s)...

Add Directory...

OK

Cancel

Used for applying the extent, cellsize and CRS of a current layer



Generating Proximity Raster

Proximity (Raster Distance)

Parameters Log

Input layer
water_bodies []

Band number
Band 1 (Gray)

A list of pixel values in the source image to be considered target pixels [optional]
[]

Distance units
Georeferenced coordinates

The maximum distance to be generated [optional]
0.000000

Value to be applied to all pixels that are within the -maxdist of target pixels [optional]
0.000000

Nodata value to use for the destination proximity raster [optional]
0.000000

► Advanced parameters

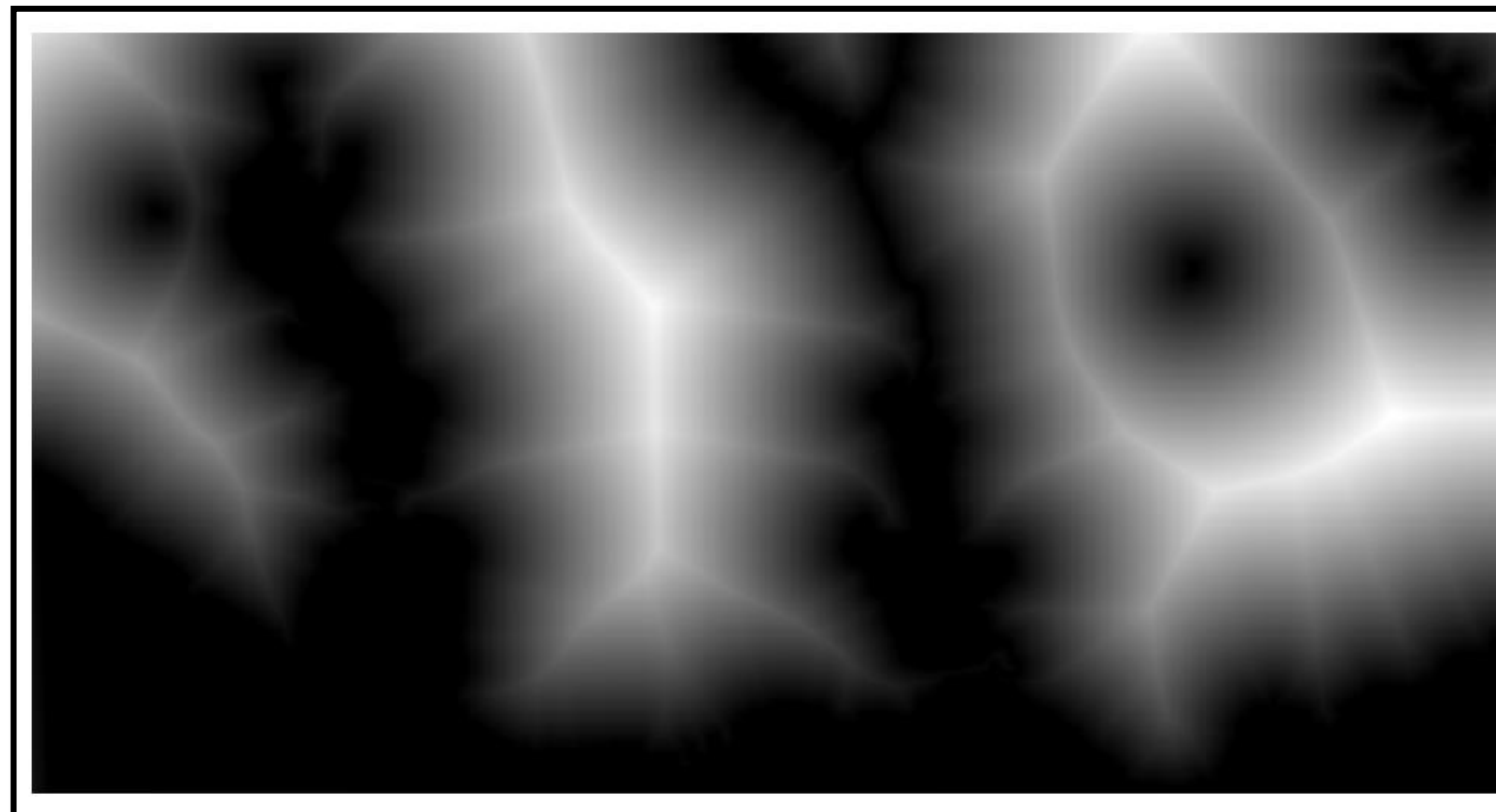
Proximity map
C:/Lecture/Lab2/process/proximity.tif

☒ Open output file after running algorithm

GDAL/OGR console call
python3 -m gdal_proximity -srcband 1 -distunits GEO -nodata 0.0 -ot Float32 -of GTiff C:/Lecture/Lab2/process/water_bodies.tif C:/Lecture/Lab2/process/proximity.tif

0%

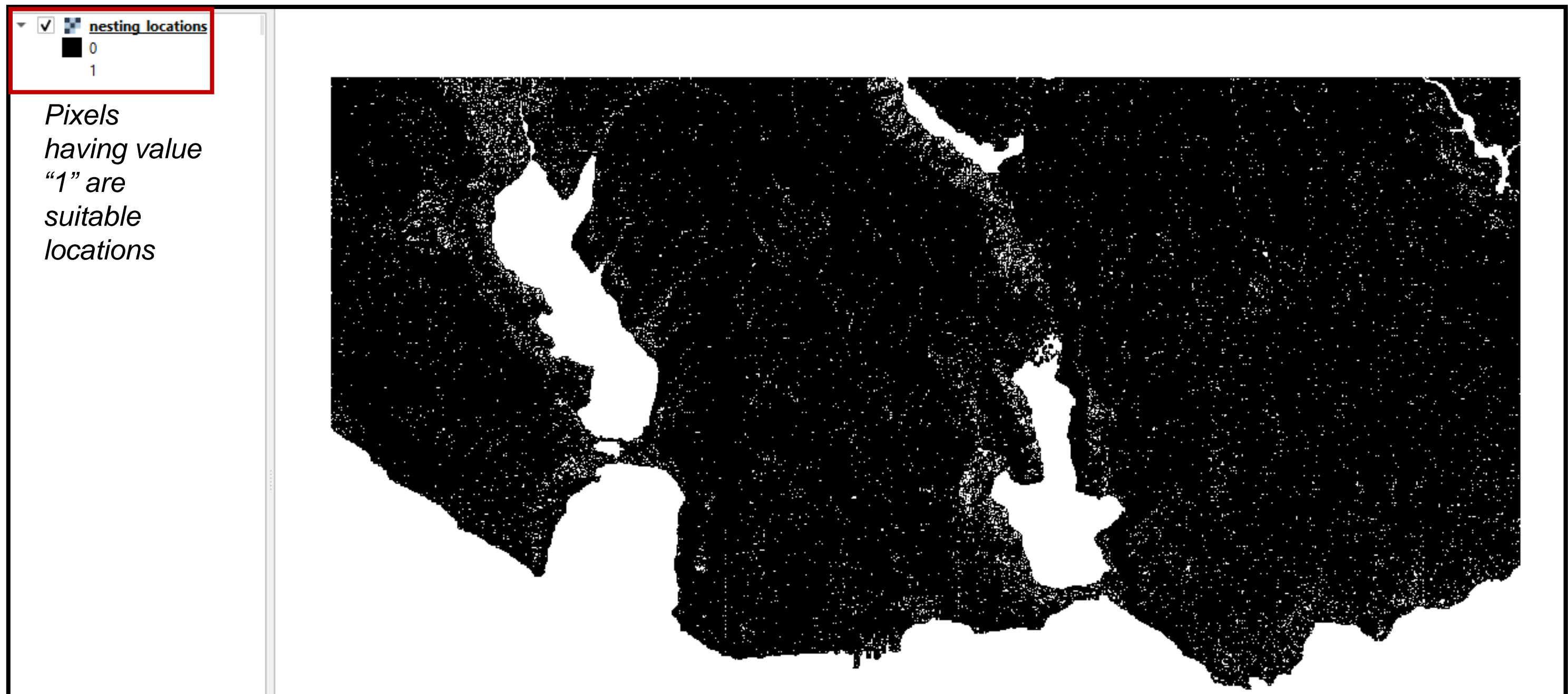
Run as Batch Process... Run Close Help



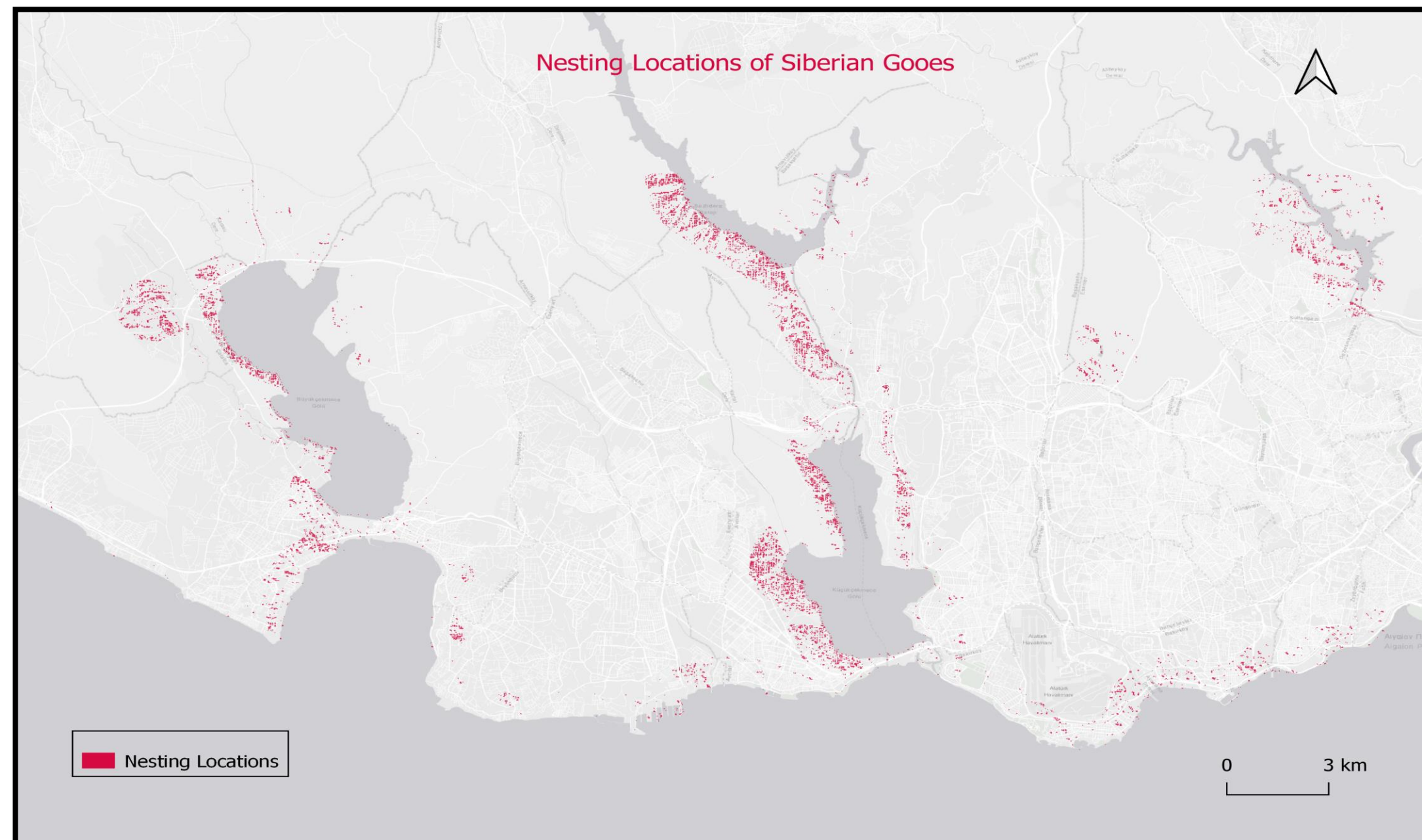
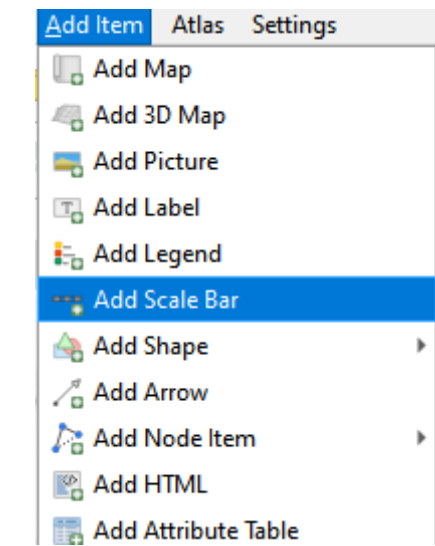
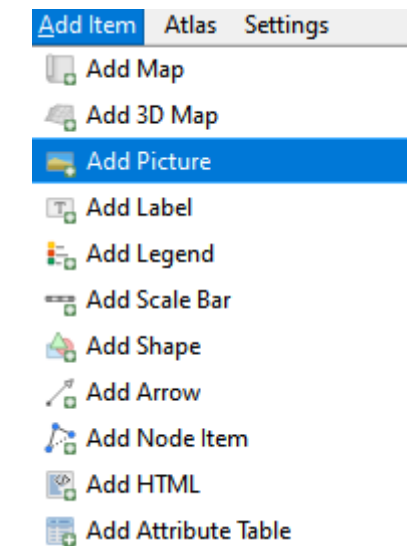
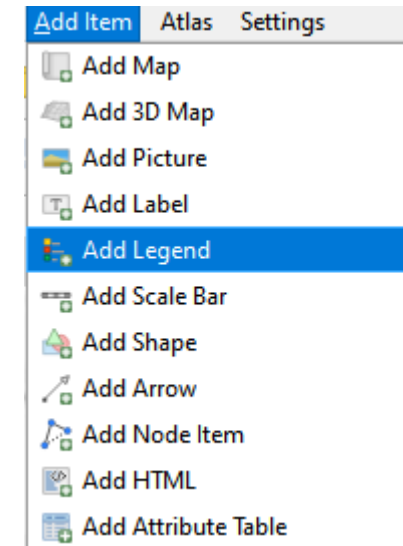
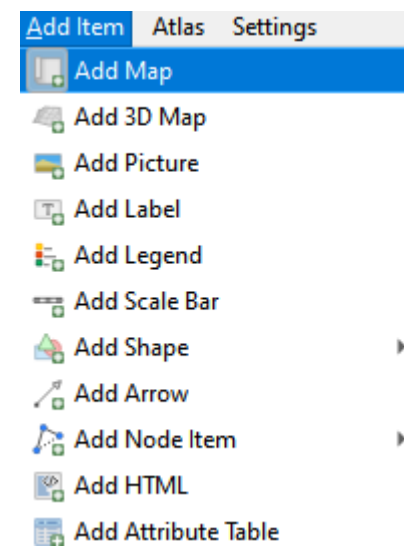
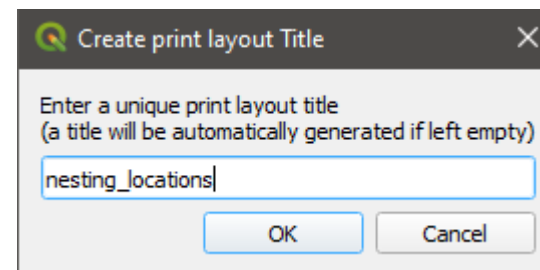
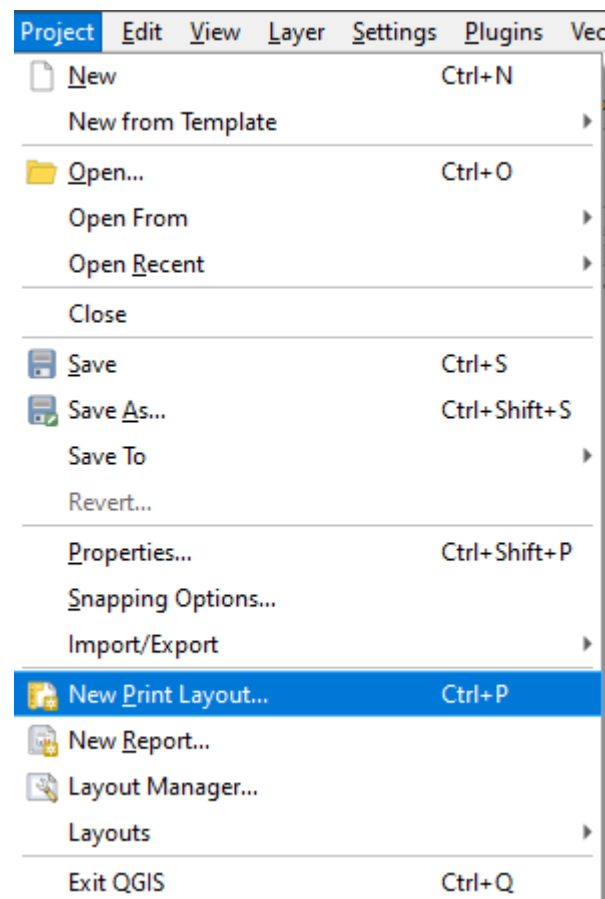
Suitability Analysis

Raster Calculator Parameters

*("aspect@1" > 22.5 AND "aspect@1" < 67.5) AND
("proximity@1" < 1000) AND
("slope@1" > 3 AND "slope@1" < 8.5)*



Creating Final Map



Results & Take Home

Our aims were

- *Find the available nesting locations of Siberian goose by considering the followings:*
 - *1000 km near the sea*
 - *Gentle or moderate slope areas*
 - *NE direction of aspect*

Output Data:

- *Nesting Locations (Raster/GeoTIFF)*

Take Home Part

- *Find areas that will be affected by a possible flood by using*
 - *350m distance from water bodies*
 - *Maximum 25m height*
 - *Having gentle or lower slope*



Contact:

akinom@itu.edu.tr