Suitability Analysis using Earthpy

This notebook will perform a suitability analysis DSM rasters using earthpy. First, I will upload a single tile and merged rasters. Then I will perform a Hillshade analysis and view the histogram. Finally, I will reclass and Multiply the rasters.

In [1]:
```
import numpy as np
import os
import rasterio
import matplotlib.pyplot as plt
```

Part 1: Uploading and Viewing the DSM

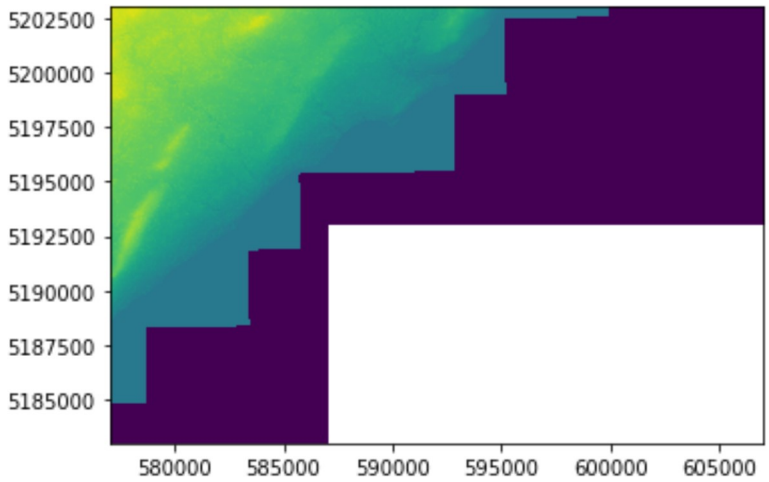
In [2]:
```
dsm= rasterio.open("D:/git/GIS5572shpfiles/projdata/q2758/2758-03-03_2652.img") ##Single Raster

dsm_full = rasterio.open('D:/git/GIS5572shpfiles/projdata/q2758/2758-01-09_2786.img') ##Merged raster from Arcpy
```

In [3]:
```
dsm
```

Out[3]:
```
<open DatasetReader name='D:/git/GIS5572shpfiles/projdata/q2758/2758-03-03_2652.img' mode='r'>
```

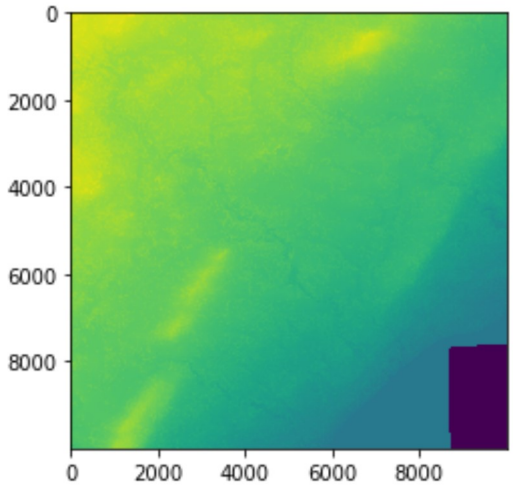
In [4]:
```
from rasterio.plot import show
```

In [5]:
```
show(dsm_full)
```



Out[5]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x22a7aad33c8>
```

In [6]:
```
show(dsm.read())
```



Out[6]: <matplotlib.axes._subplots.AxesSubplot at 0x22a00353988>

Part 2: Hillshade and Histogram

In [14]:
```
elevation = dsm.read(1) ##single tile

full_elevation = dsm_full.read(1) ##merge tile
```

In [16]:
```
import earthpy.spatial as es
import earthpy.plot as ep
```

In [18]:
```
WinAM_52 = es.hillshade(elevation, azimuth=131.87, altitude = 5) ##Sing
le tile

#Hillshade at winter moring solstice
```

In [20]:
```
WinPM_52 = es.hillshade(elevation, azimuth=228.11, altitude = 5) ##Sing
le tile

##Hillshade at winter evening solstice
```

In [21]:
```
SumAM_52 = es.hillshade(elevation, azimuth=60.66, altitude = 5) ##Singl
e tile

##Hillshade at summer morning solstice
```

In [22]:
```
SumPM_52 = es.hillshade(elevation, azimuth =299.33, altitude = 5) ##Sin
gle tile

##Hillshade at summer evening solstice
```

In [23]:
```
WinAM_86 = es.hillshade(full_elevation, azimuth=131.87, altitude = 5) #
#Merged tile

#Hillshade at winter moring solstice
```

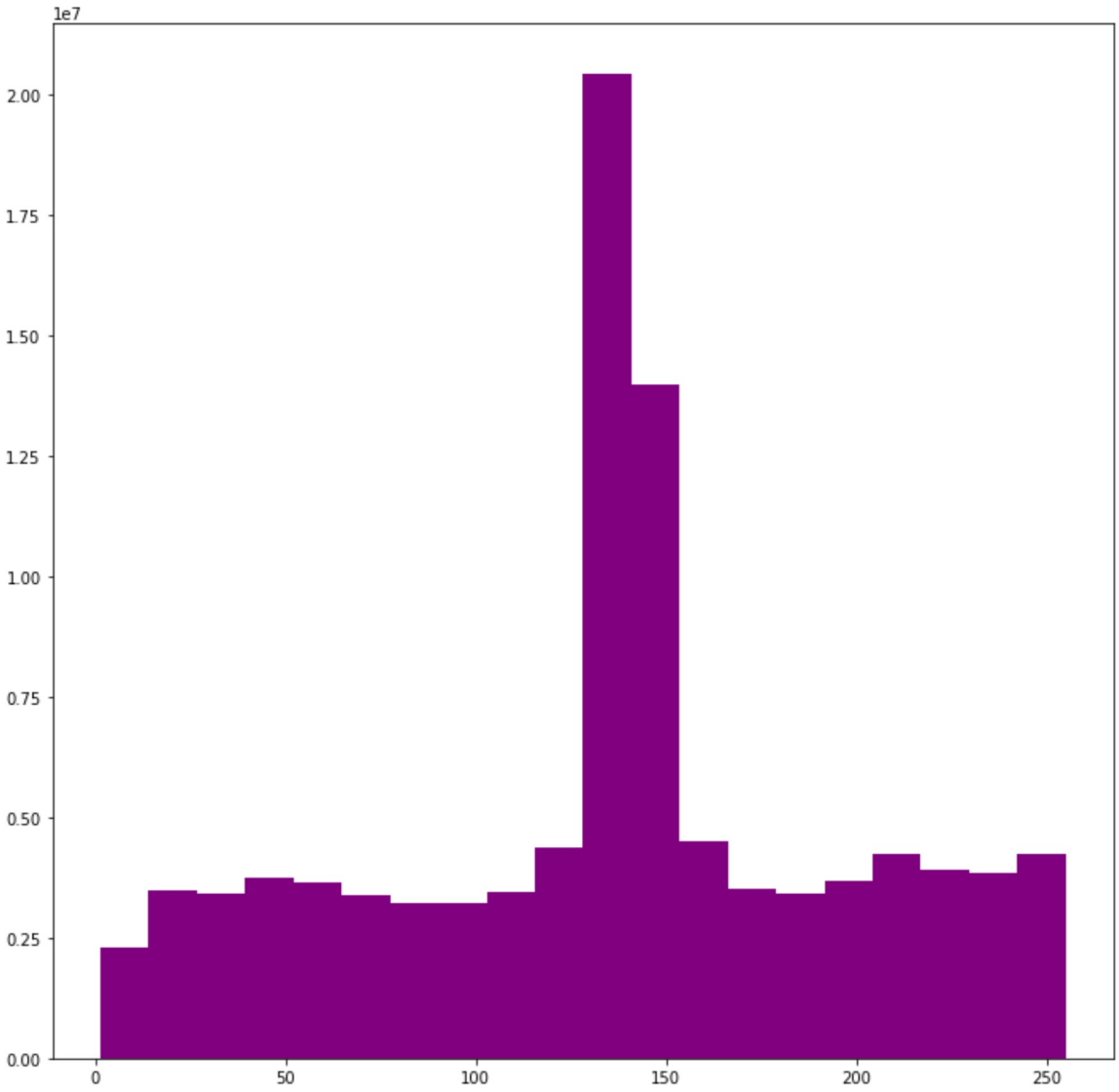
In [24]:
```
WinPM_86 = es.hillshade(full_elevation, azimuth=228.11, altitude = 5) #
#Merged tile

##Hillshade at winter evening solstice
```

In [25]:
```
SumAM_86 = es.hillshade(full_elevation, azimuth=60.66, altitude = 5) ##
Merged tile

##Hillshade at summer morning solstice
```

In [26]:
```
SumPM_86 = es.hillshade(full_elevation, azimuth =299.33, altitude = 5)
##Merged tile

##Hillshade at summer evening solstice
```

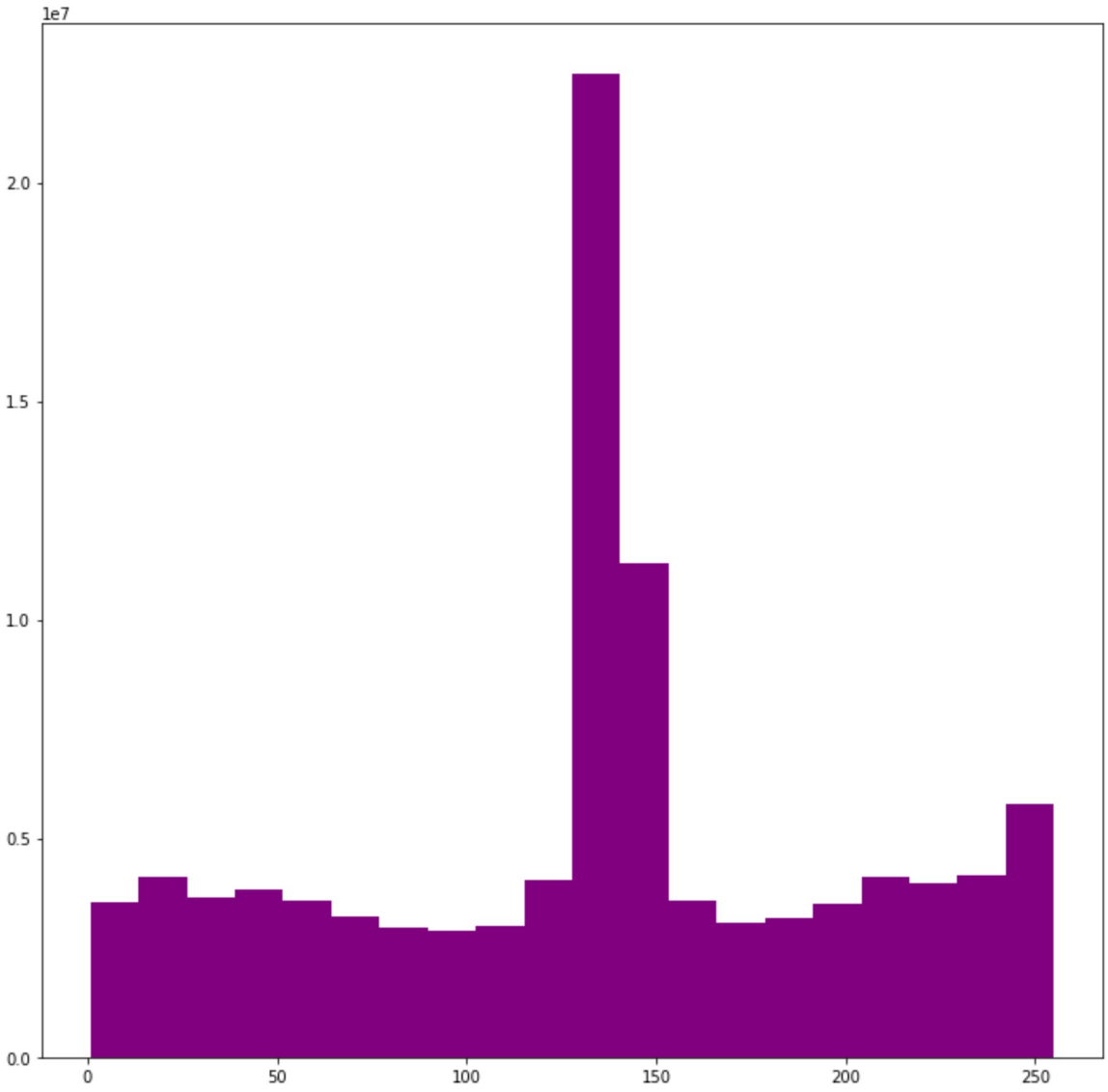
In [28]:
```
ep.hist(WinAM_52) ##histogram of winter morning solstice
```

Out[28]:
```
(<Figure size 864x864 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x22a181a49c8>)
```



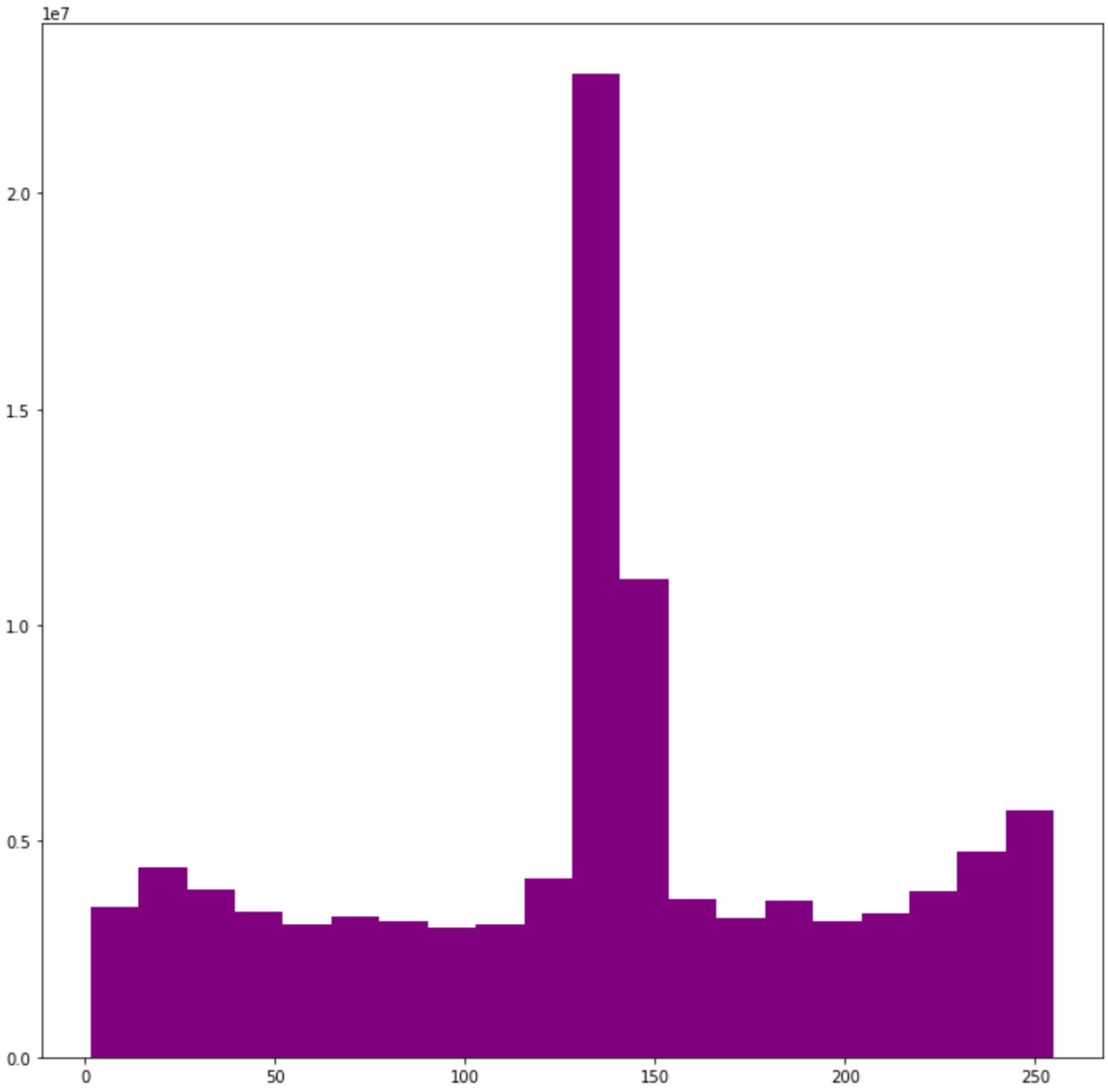
In [29]:
```
ep.hist(WinPM_52) ##histogram of winter evening solstice
```

Out[29]:
```
(<Figure size 864x864 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x22a1b16a888>)
```



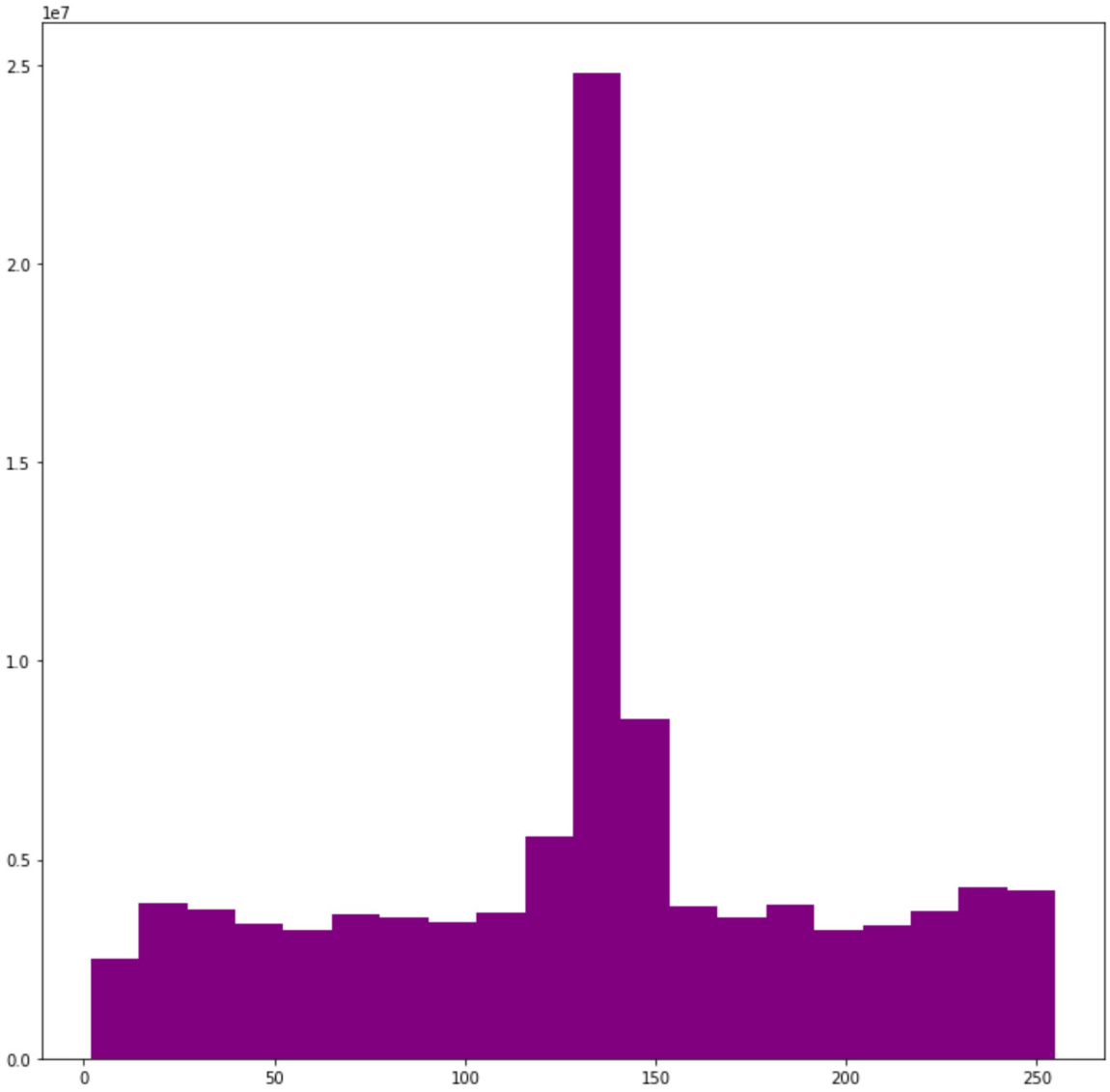
In [30]:
```
ep.hist(SumAM_52) ##Histogram of summer morning soltice
```

Out[30]:
```
(<Figure size 864x864 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x22a1b6b6c88>)
```



In [31]:
```
ep.hist(SumPM_52) ##histogram of summer evening solstice
```

Out[31]:
```
(<Figure size 864x864 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x22a1b740388>)
```

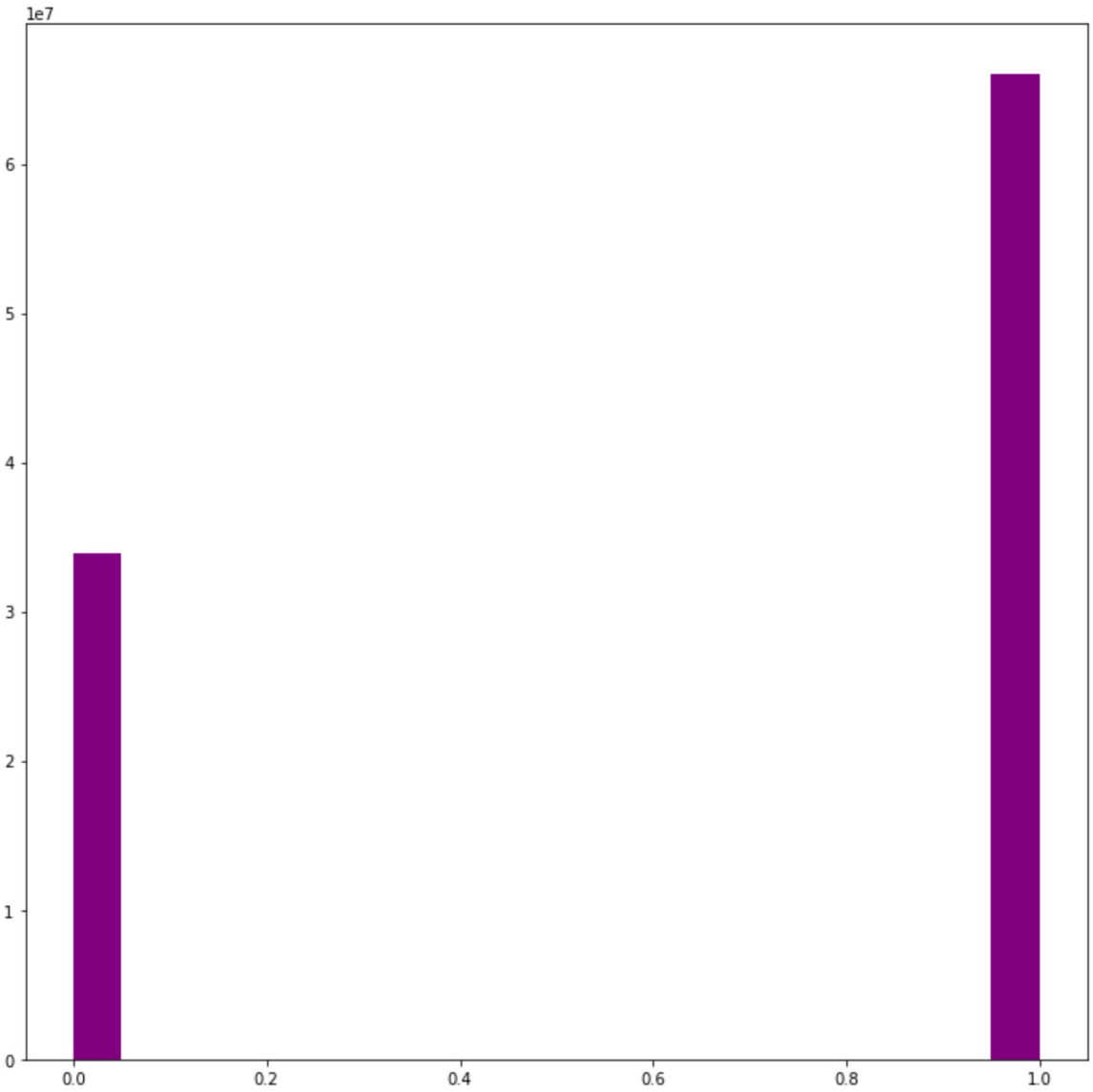


Part 3: Reclass and Multiply Rasters

In [32]:
```
WinAM_52[WinAM_52 <= 127.5] = 0
WinAM_52[WinAM_52 > 127.5] =1

##Reclass single tile winter morning soltice
```

In [33]:
```
ep.hist(WinAM_52) ##New Histogram
```

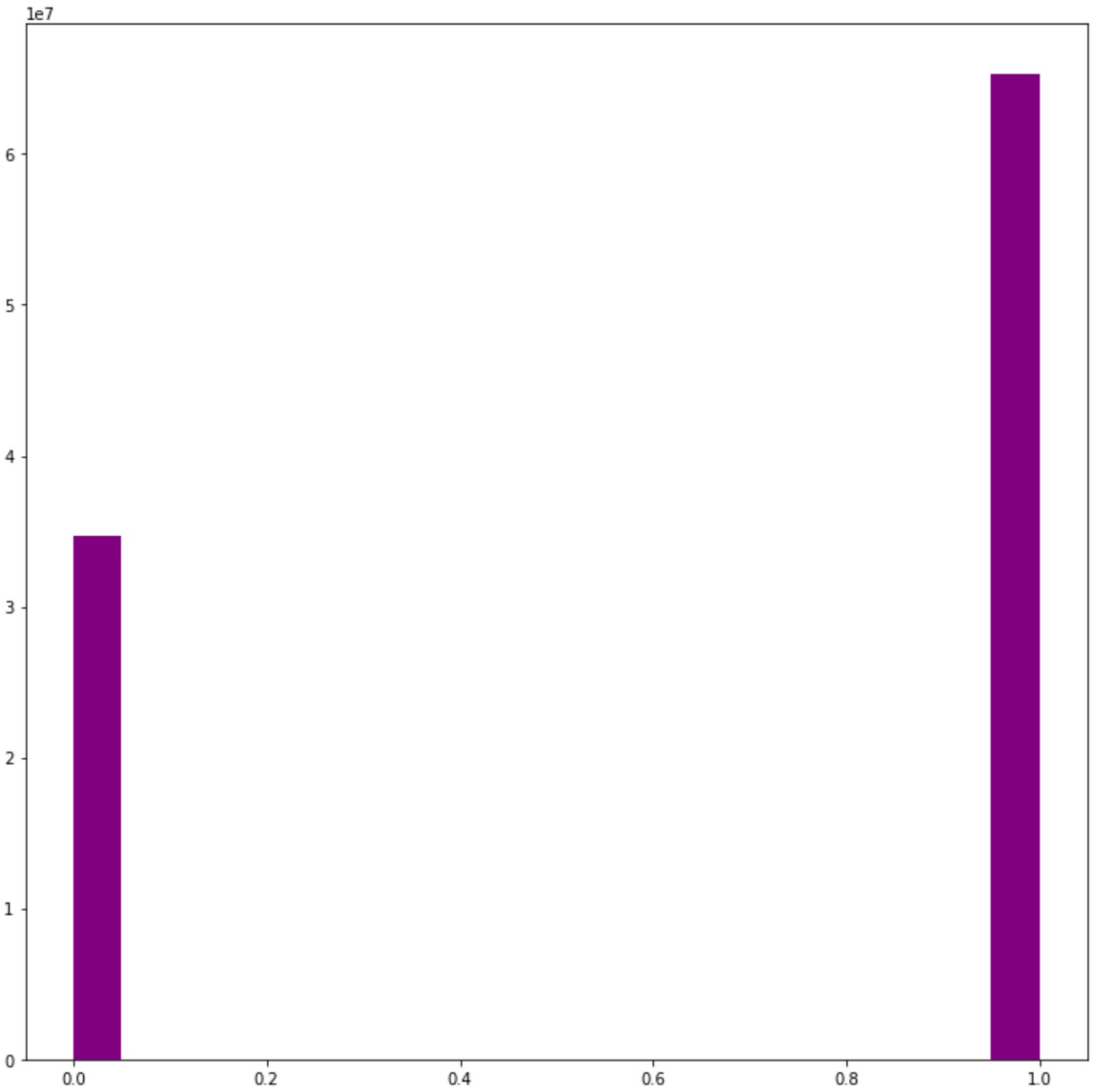
Out[33]:
```
(<Figure size 864x864 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x22a1bee3ec8>)
```



In [34]:
```
WinPM_52[WinPM_52 <= 127.5] = 0
WinPM_52[WinPM_52 > 127.5] =1

##Reclass single tile winter evening Solstice
```

In [35]:
```
ep.hist(WinPM_52) ## new histogram
```

Out[35]:
```
(<Figure size 864x864 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x22a1bc769c8>)
```

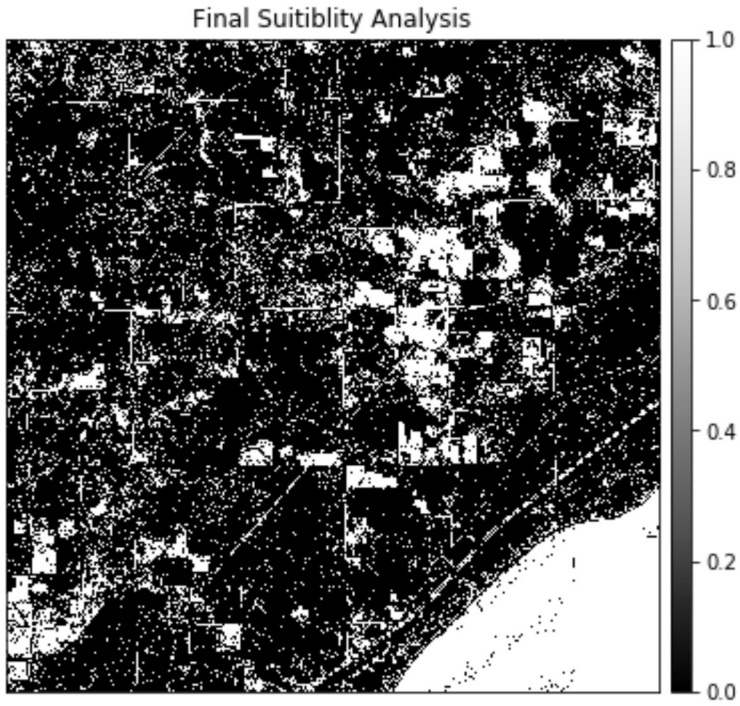


In [36]:
```
SumAM_52[SumAM_52 <= 127.5] = 0
SumAM_52[SumAM_52 > 127.5] =1

##Reclass single tile summer morning Solstice
```

In [37]:
```
SumPM_52[SumPM_52 <= 127.5] = 0
SumPM_52[SumPM_52 > 127.5] =1

##Reclass single tile summer evening Solstice
```

In [39]:
```
Final_52 = WinAM_52 * WinPM_52 * SumAM_52 *SumPM_52      ##Multiplying r
asters
```

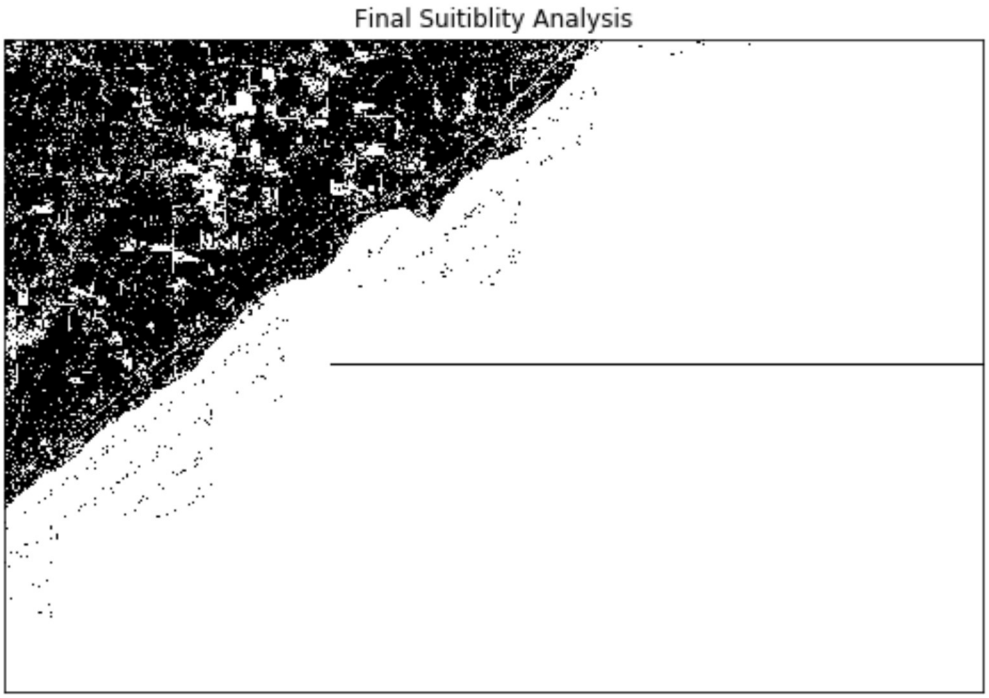
In [40]:
```
ep.plot_bands(
    Final_52,
    cbar=True,
    title="Final Suitiblity Analysis",
    figsize=(10, 6),
)

plt.show() ##Final result
```



In [41]:
```
WinAM_86[WinAM_86 <=127.5] = 0
WinAM_86[WinAM_86 > 127.5] = 1

SumAM_86[SumAM_86 <= 127.5] = 0
SumAM_86[SumAM_86 > 127.5] = 1

WinPM_86[WinPM_86 <= 127.5] = 0
WinPM_86[WinPM_86 > 127.5] = 1

SumPM_86[SumPM_86 <= 127.5] = 0
SumPM_86[SumPM_86 > 127.5] = 1


##Repeating reclass with merged raster
```

In [42]:
```
Final_86 = WinAM_86 * WinPM_86 * SumAM_86 * SumPM_86 ##multiplying merg
ed raster
```

In [43]:
```
ep.plot_bands(
    Final_86,
    cbar=False,
    title="Final Suitiblity Analysis",
    figsize=(10, 6),
)

plt.show() ##Final Raster
```



In [64]:
```
import pickle
```

In [65]:
```
filename = 'final_52_array.p'
with open(filename, 'wb') as filehandler:
    pickle.dump(Final_52, filehandler)


##Saving the single tile array so that I can open it in arcpy.
```

The final array will be downloaded to arc pro. This concludes the notebook.

In [ ]: