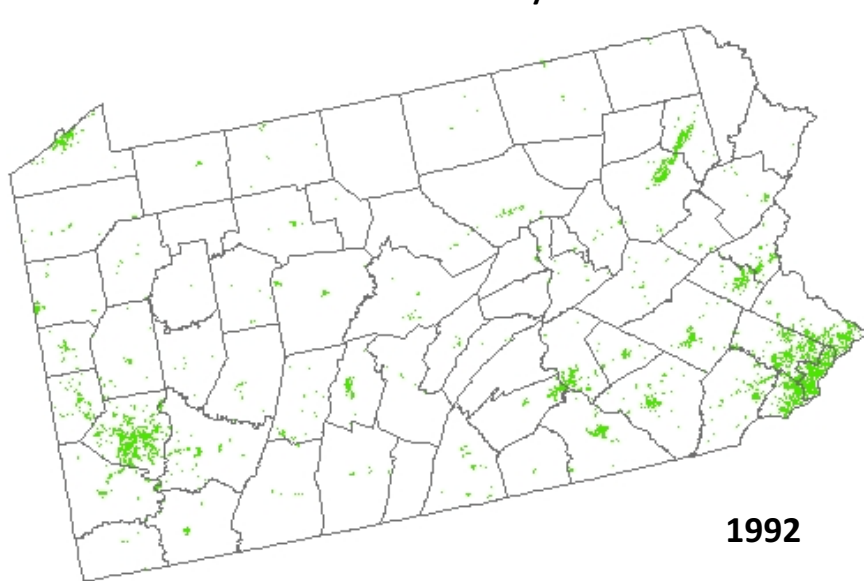


Urban Growth vs Development Suitability Using Raster Overlay

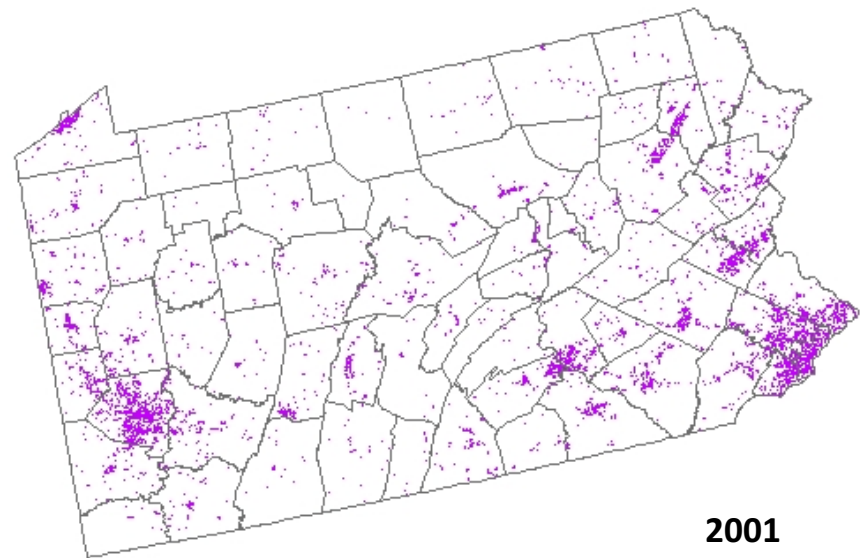
Overview: The Pennsylvania Department of Environmental Protection (DEP) is considering providing funds to local land conservancies to acquire important resources to protect lands threatened by likely urban development. This analysis evaluates areas of threat and opportunities with respect to future development – where are areas “sensitive” to development but where development may be infringing upon in the coming years?; where are areas not environmentally sensitive to development where development is likely to be more encouraged in future years?

Software used: ESRI ArcGIS

Urban Locations in Pennsylvania

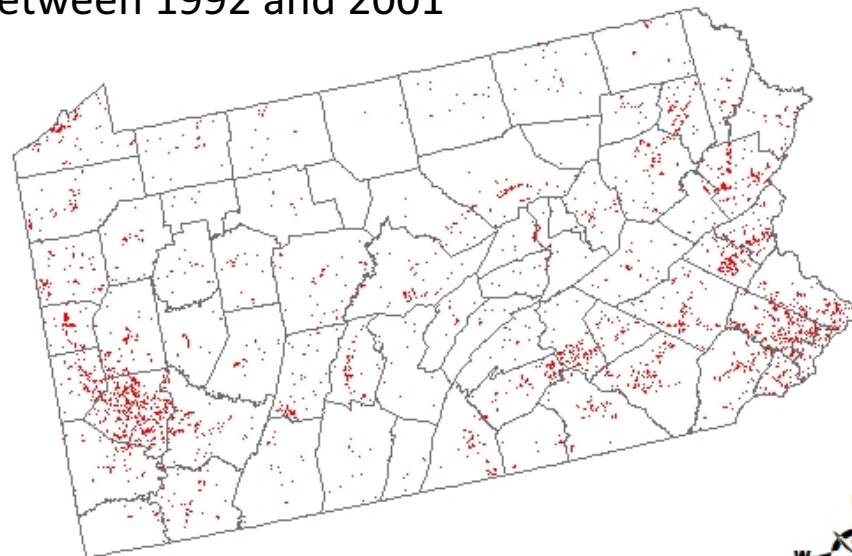


1992



2001

Urbanized Locations between 1992 and 2001

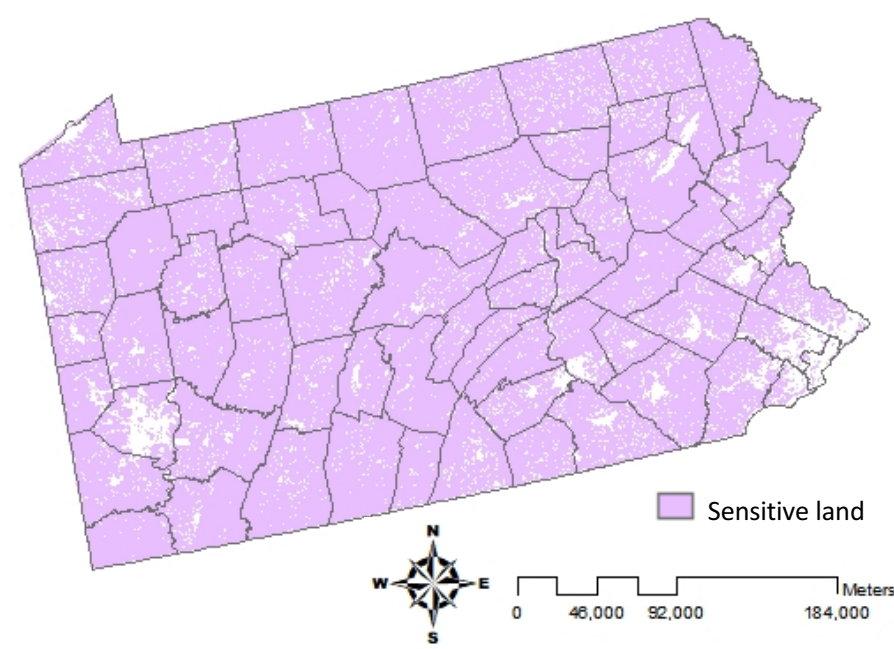


Newly converted grid
cell count: **12418**

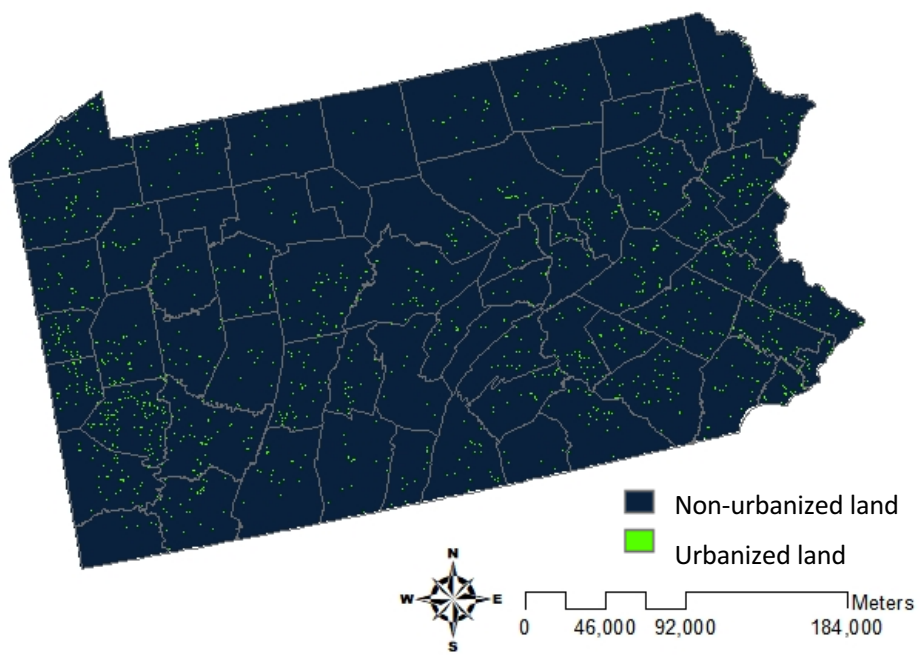


0 46,000 92,000 184,000 Meters

1992 Sensitive Lands



Urbanized Sensitive Lands



The combined raster layers of water, farm, pasture, and forest into one map representing “Sensitive Land Areas” show that sensitive lands dominated most of the state in 1992.

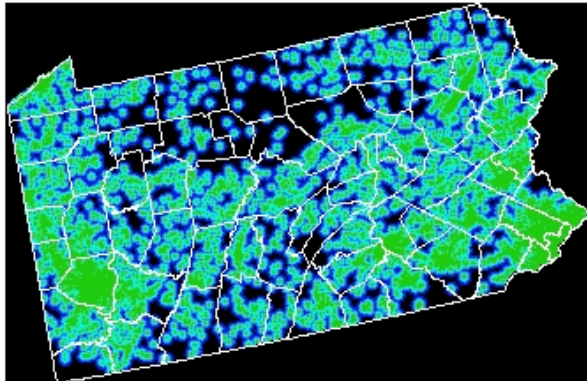
The counties with the least number of sensitive grid cells are those that have Pennsylvania’s major cities, such as Philadelphia on the Southeast, Pittsburgh on the Southwest, Harrisburg on South Center and Wilkes-Barre towards the Northeast.

Most of the counties on the Northeast and North Center have approximately 90% or more sensitive lands in them – these are mostly forest lands.

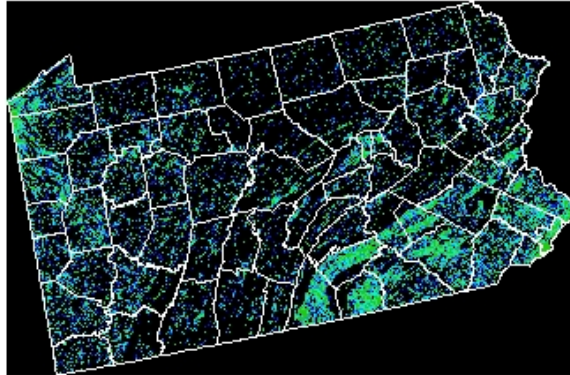
When observing the distribution of urbanized lands throughout the state of Pennsylvania between 1992 and 2001, there does not seem to be a particular trend on where urbanization occurred. Rather, urbanization seems to have occurred all throughout the state, perhaps, more on the Southeast and Southwest. On the other hand, counties on the North Center, where forests are more prevalent, has had less urbanization. This makes sense, as two of Pennsylvania’s largest cities are located in these regions. The already existing location of major cities might have been another reason for more urbanization to have happened closeby. From an environmentalist perspective, if urbanization were to occur, developing land close to already existing cities is ideal as it prevents sprawl and instead, encourages the densification of cities.

Decision Factors for Future Urbanization

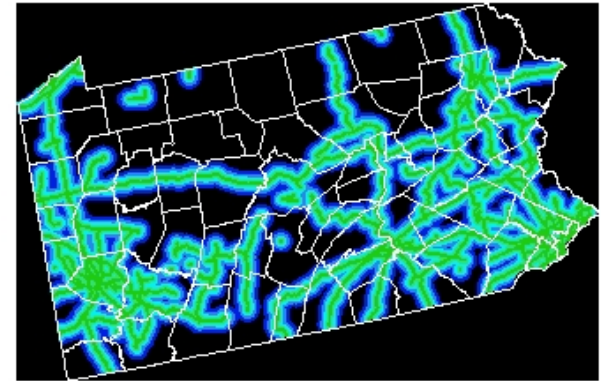
0 35,500 71,000 142,000 Meters



(i) Sites within 6 km of existing urban development

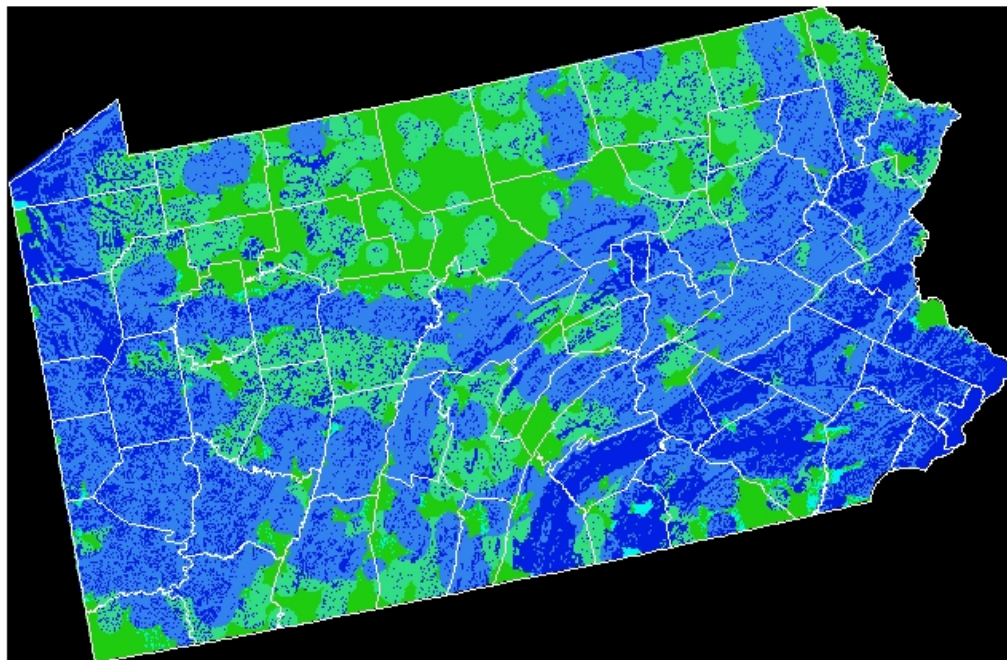


(ii) Sites with slope less than 2 degrees grade



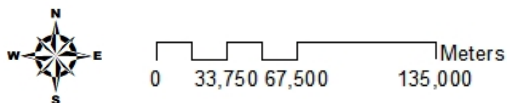
(iii) Sites within 10 km of 4-lane highways

Future Urbanization Index (FUI)

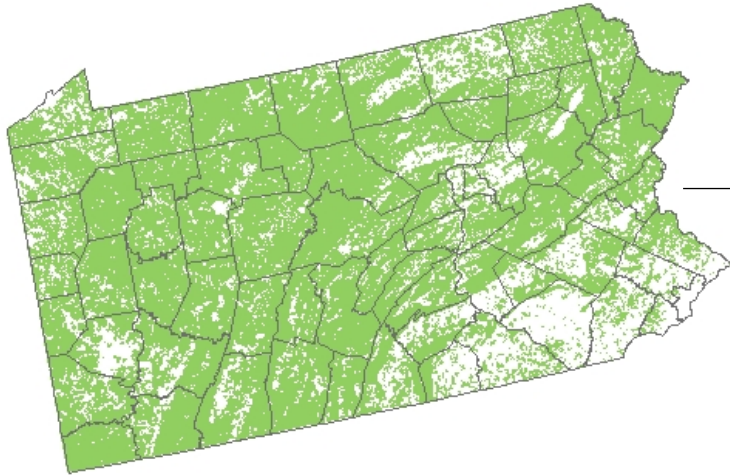


The combination of the three decision factors shown above yielded the final Future Urbanization Index map on the left. Based on the weighted totals, the blue areas indicate areas where urbanization is likely to occur in the future. Although the areas in green also show lands with the potential to be urbanized, the higher suitability index values show that the areas in blue are likely to be preferred over the lands in green.

Weighted Suitability Index Values



Decision Factors for Land Preservation

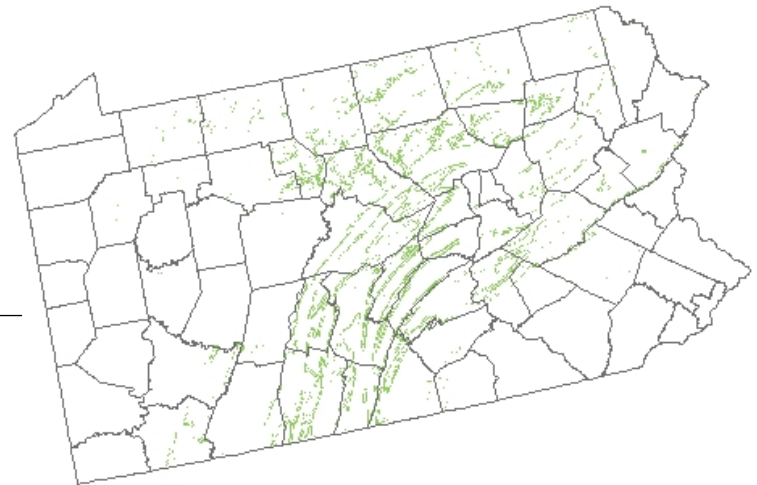


(i) Sites in active farm and forest use

A weight scale of 3 was chosen in order to protect the farm and forest lands in risk of more degradation. It is important to protect these lands and in turn, prevent sprawling .

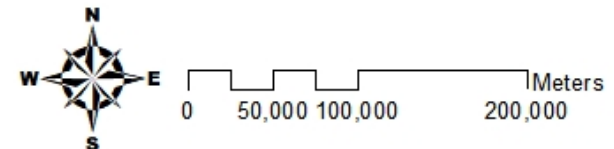
(ii) Sites with slope greater than 15 degrees grade

A weight scale of 2 was chosen because the hillsides provide both land shade for existing animals in the area and developing on sloped lands can be more costly due to more detailed planning that is involved. However, with better technology today and compared to the other decision factors, sloped land was weighted the least.

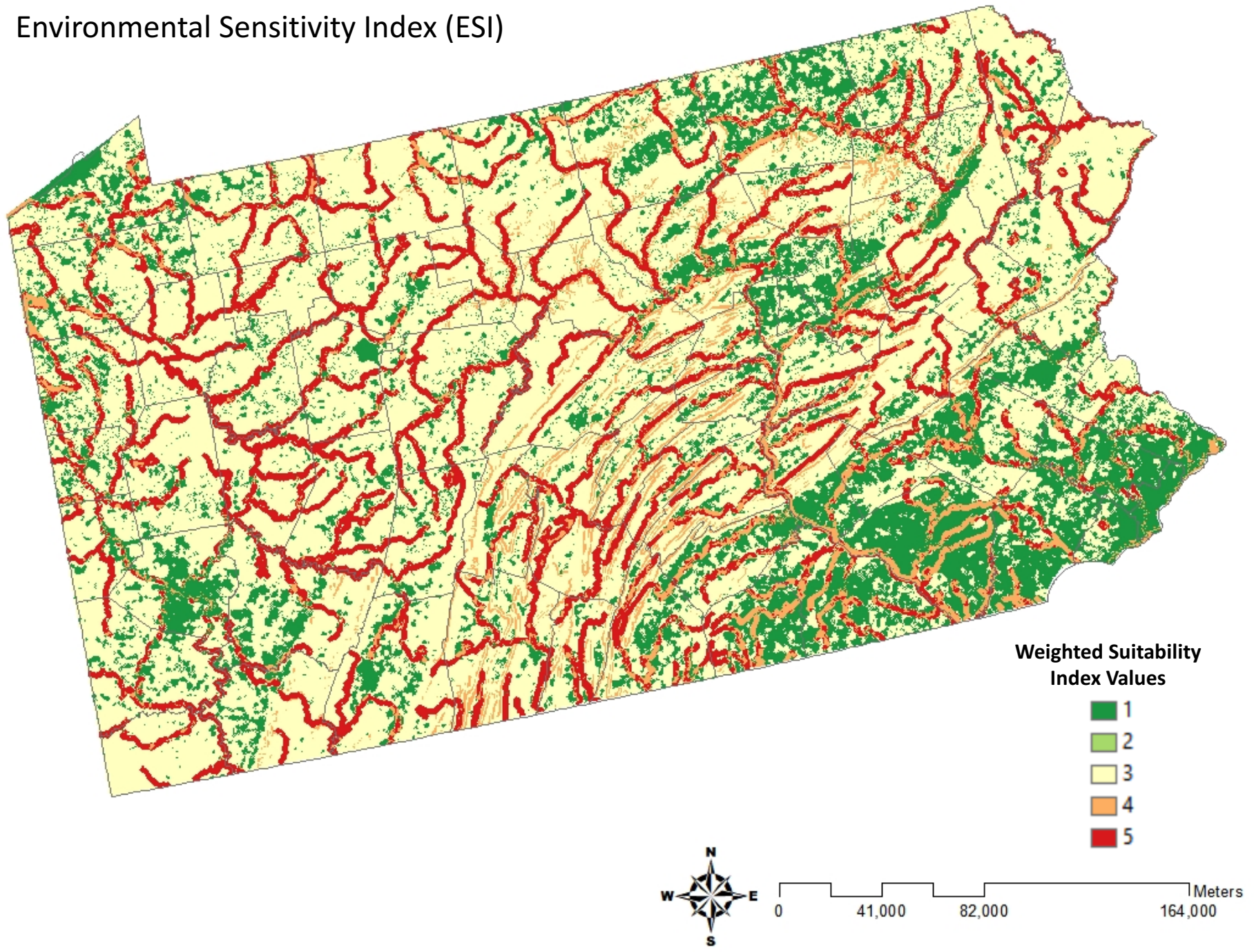


(iii) Sites within 1 km of rivers

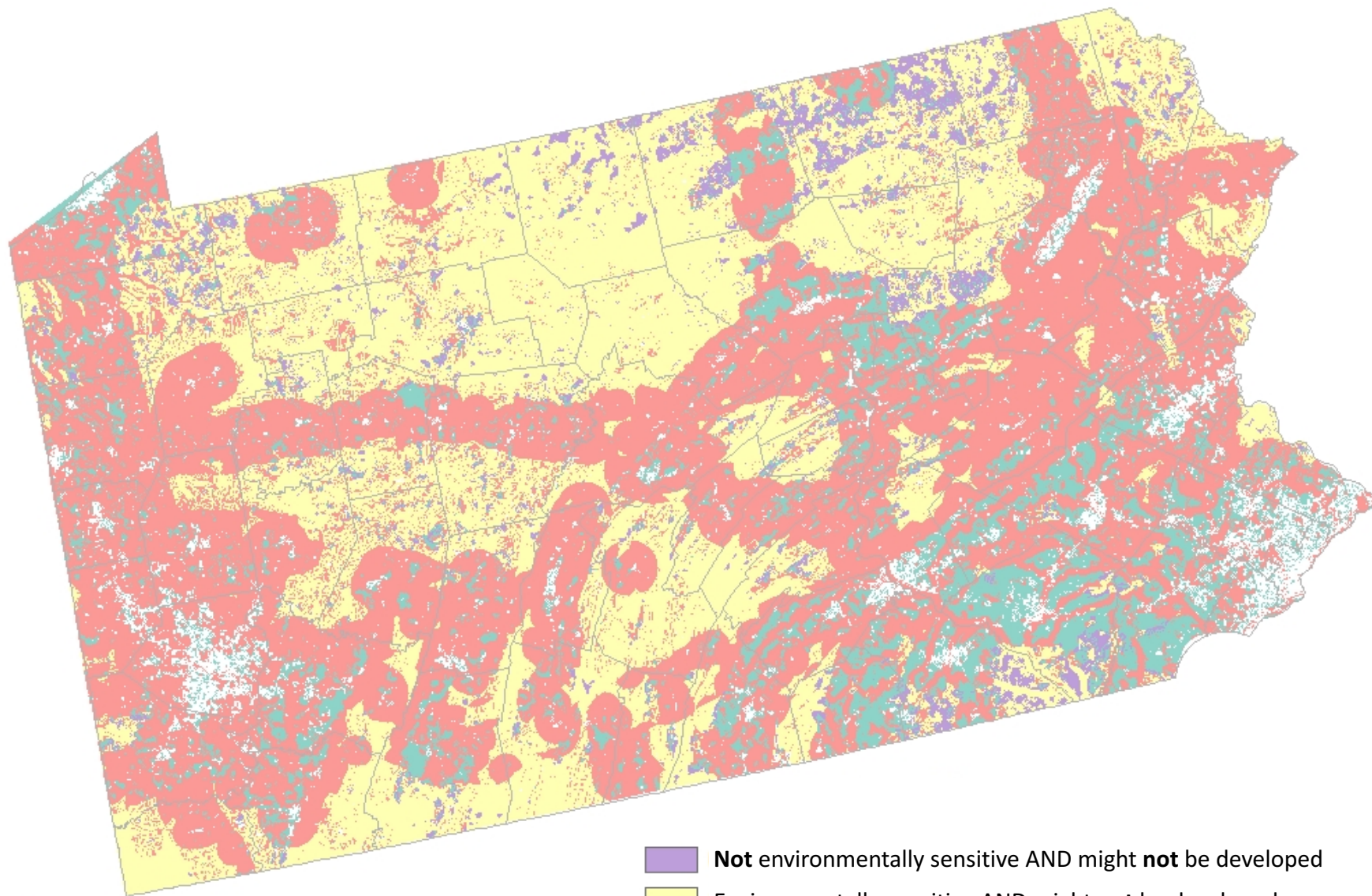
The highest weight scale was attributed to lands close to rivers because rivers tend to change the most over time. The meanders expand, altering the land shape and they also flood, extending out to the lands they usually run. It is important to preserve these lands in order to prevent extreme flooding through channels and altered wildlife habitat patterns.







Environmental Sensitivity Index (ESI)



Final Suitability (FUI + ESI)



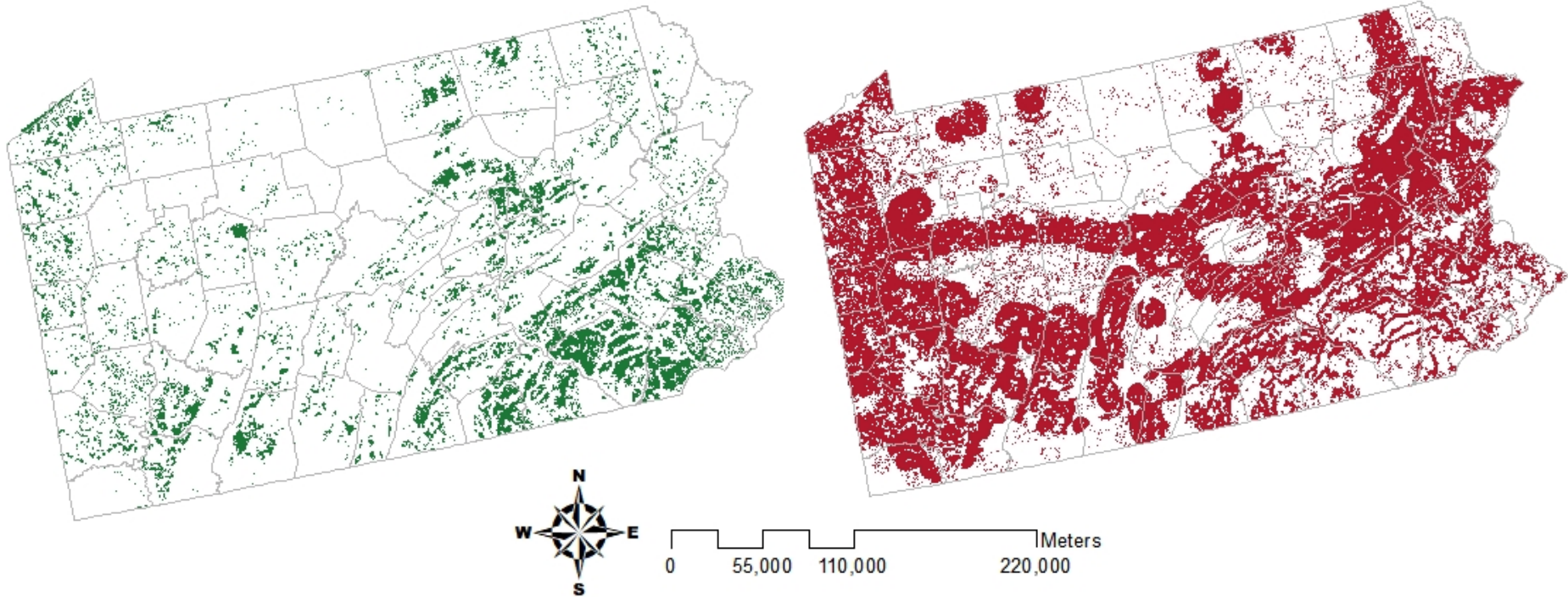
-  **Not** environmentally sensitive AND might **not** be developed
-  Environmentally sensitive AND might **not** be developed
-  **Not** environmentally sensitive AND **might be** developed
-  Environmentally sensitive AND **might be** developed



0 48,000 92,000 184,000 Meters

Areas that are **not** environmentally sensitive
AND **might be** developed

Areas that **are** environmentally sensitive
AND **might be** developed



Comment on Philadelphia County:

The analysis showed back in 1992, most of the Pennsylvania state had sensitive lands. Continuing urbanization patterns from 1992 to 2001 has shown that urbanization seemed to have occurred all throughout the state, but has occurred near already existing big cities, such as Philadelphia and Pittsburgh. This can be seen as a good sign, since increasing environmental concerns push for making cities more dense and limit sprawl. To complement this, the future urbanization index, based on the favorable decision factors also show the potential for future urbanization to occur near cities. However, just as much as it is important to predict locations of possible urbanizations in the future, it is just as important to point out sensitive lands that need protection and priority to preserve. As shown by the decision factors for land preservation, the areas that are considered to be likely to be developed are also close to the cities, many lands which overlap with the FUI map. This possibly shows some of the difficulties for planners and government officials as they get involved in big planning/development projects and need to prioritize different factors when making decisions like these. In some ways, these maps may also make sense up to a limited extent as they do not always take into consideration the outside influences that may or may not make the representation and analysis of these maps true. In other words, although the data may show a certain result, it may not always be reflective of reality, although the models may be a good way to get a general idea of how things may change in the future or what may be expected.