Settlement Patterns in Pre-Colombian Oaxaca Valley
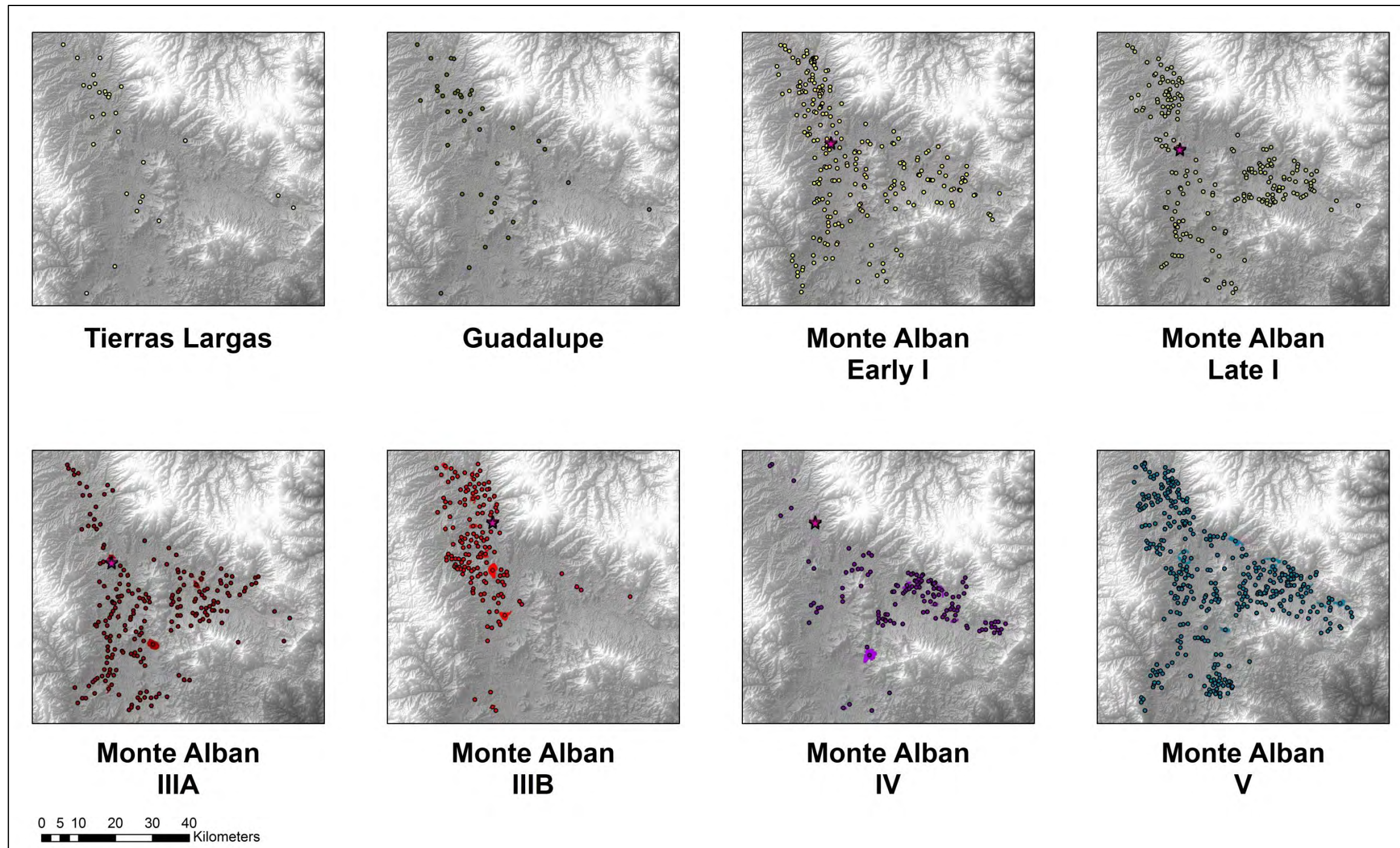
Aria Klucewicz (Geography 592)

RESEARCH QUESTION: What environmental (or other) factors affected where ancient people settled in Oaxaca Valley, Mexico??
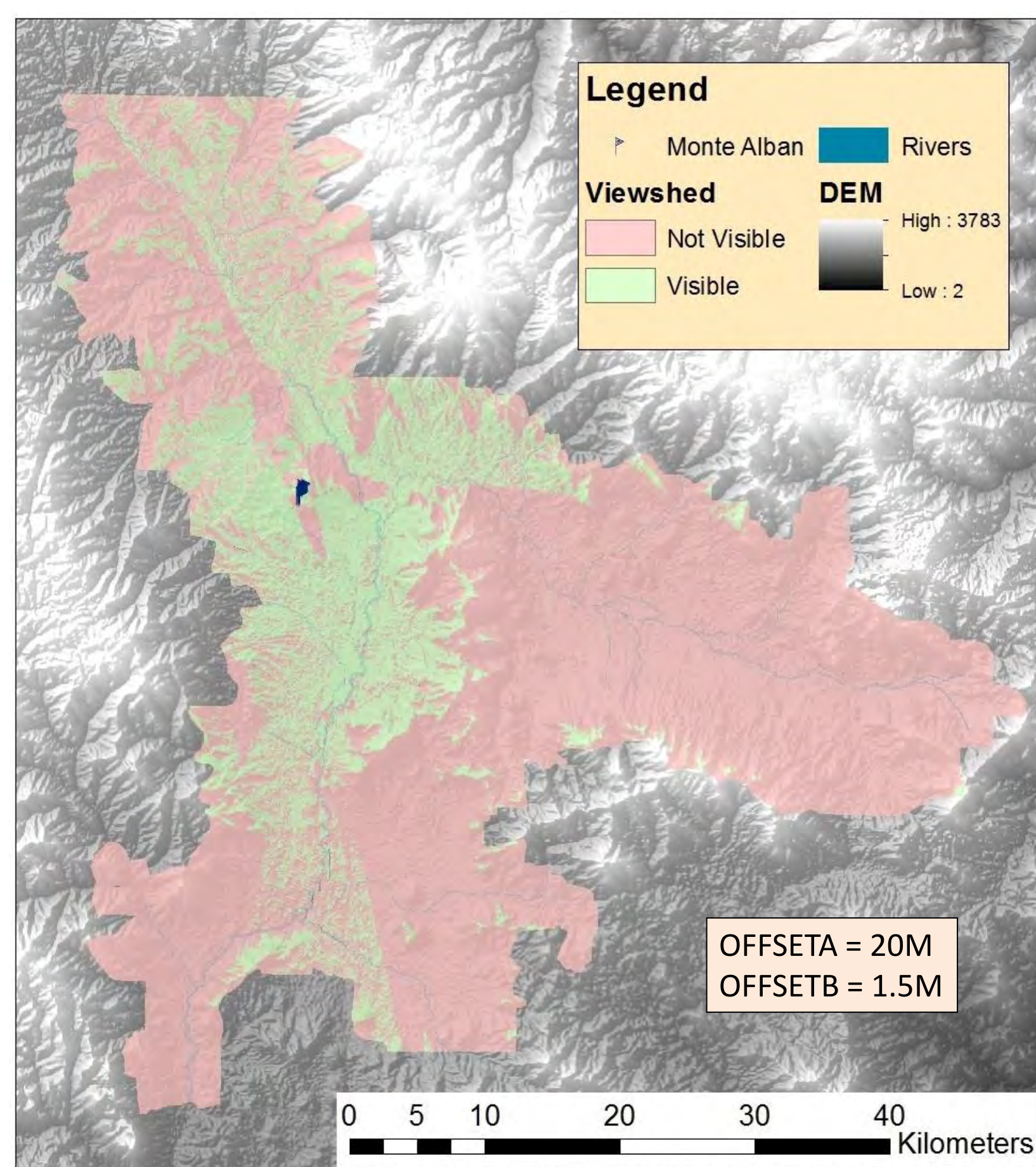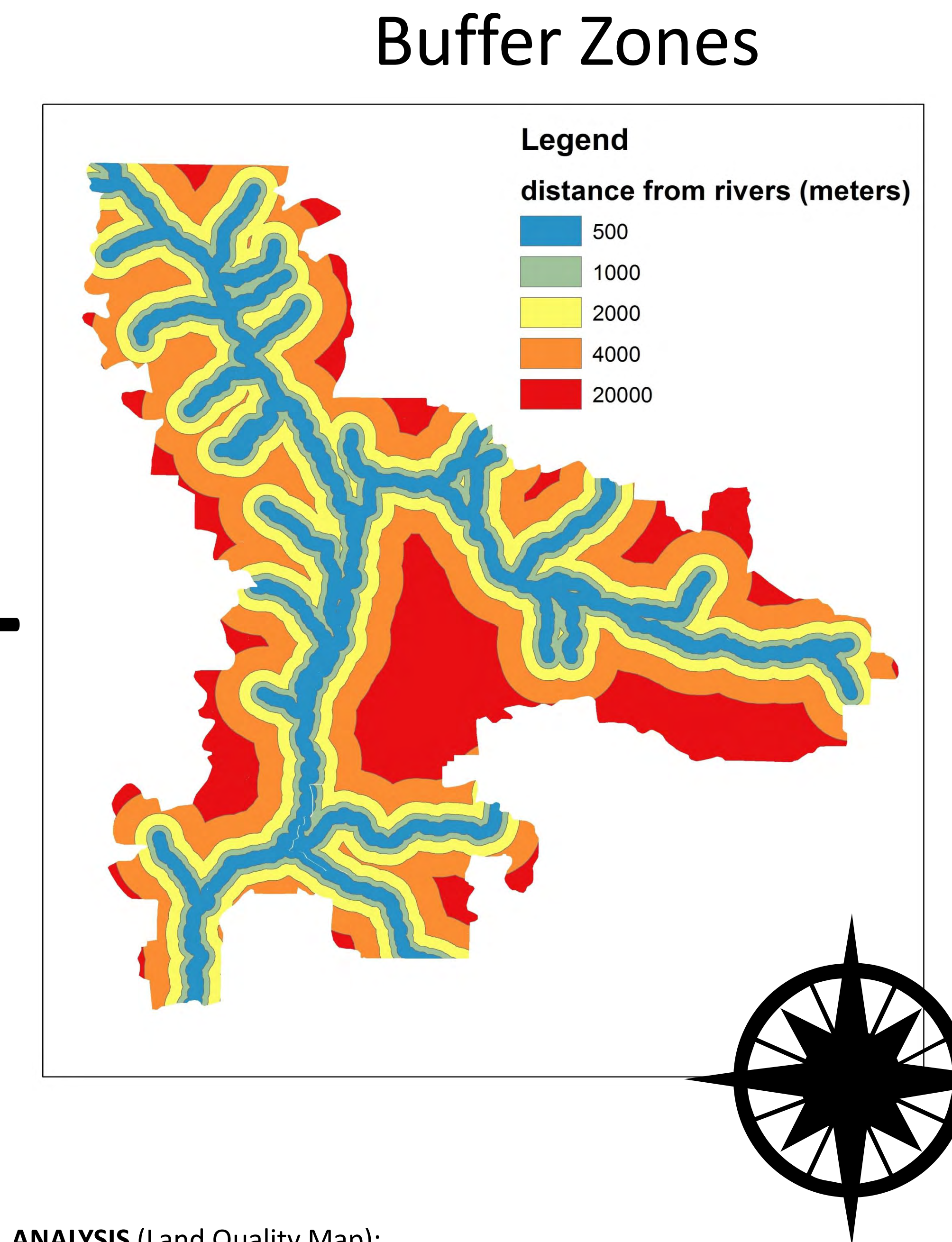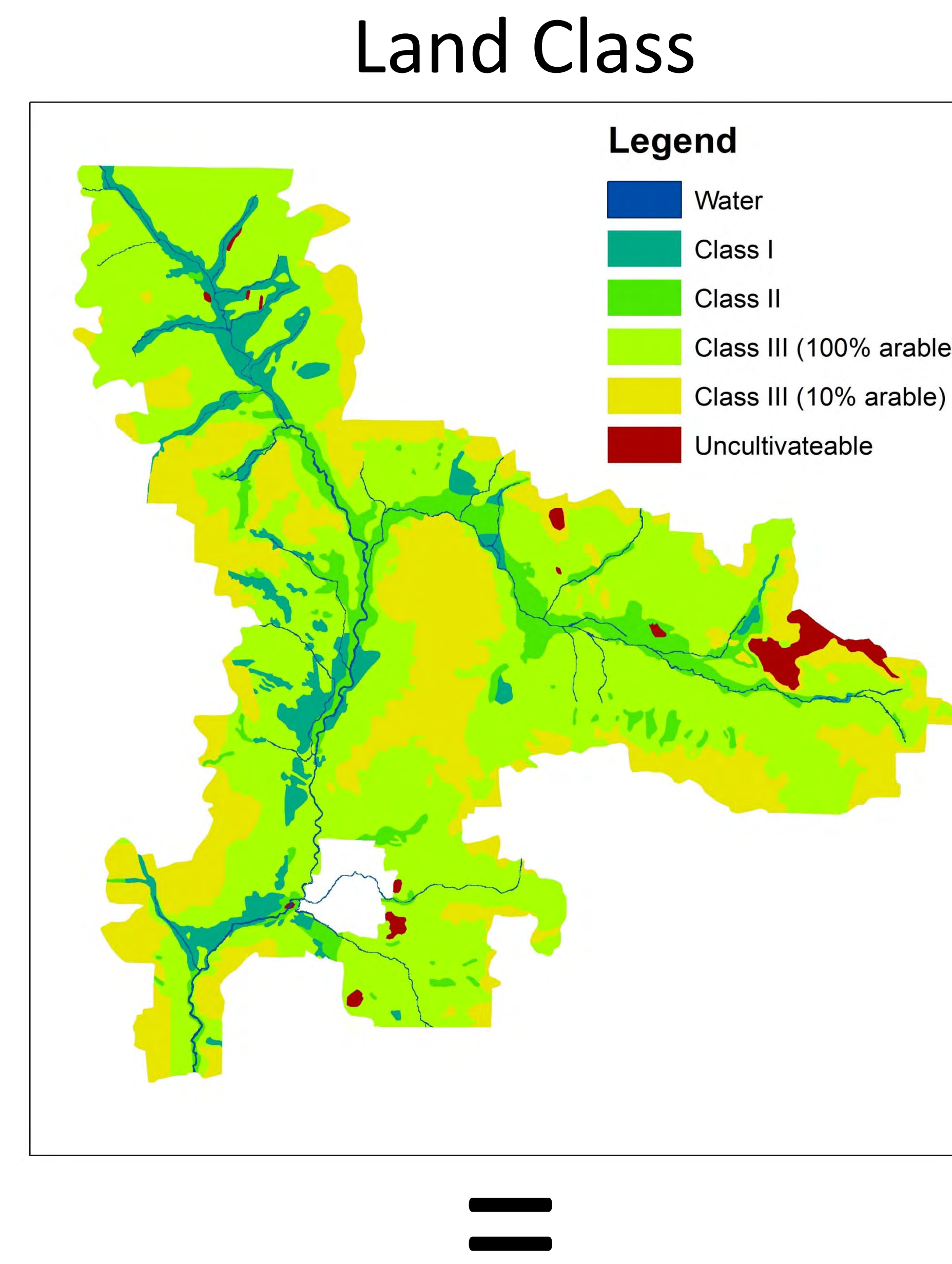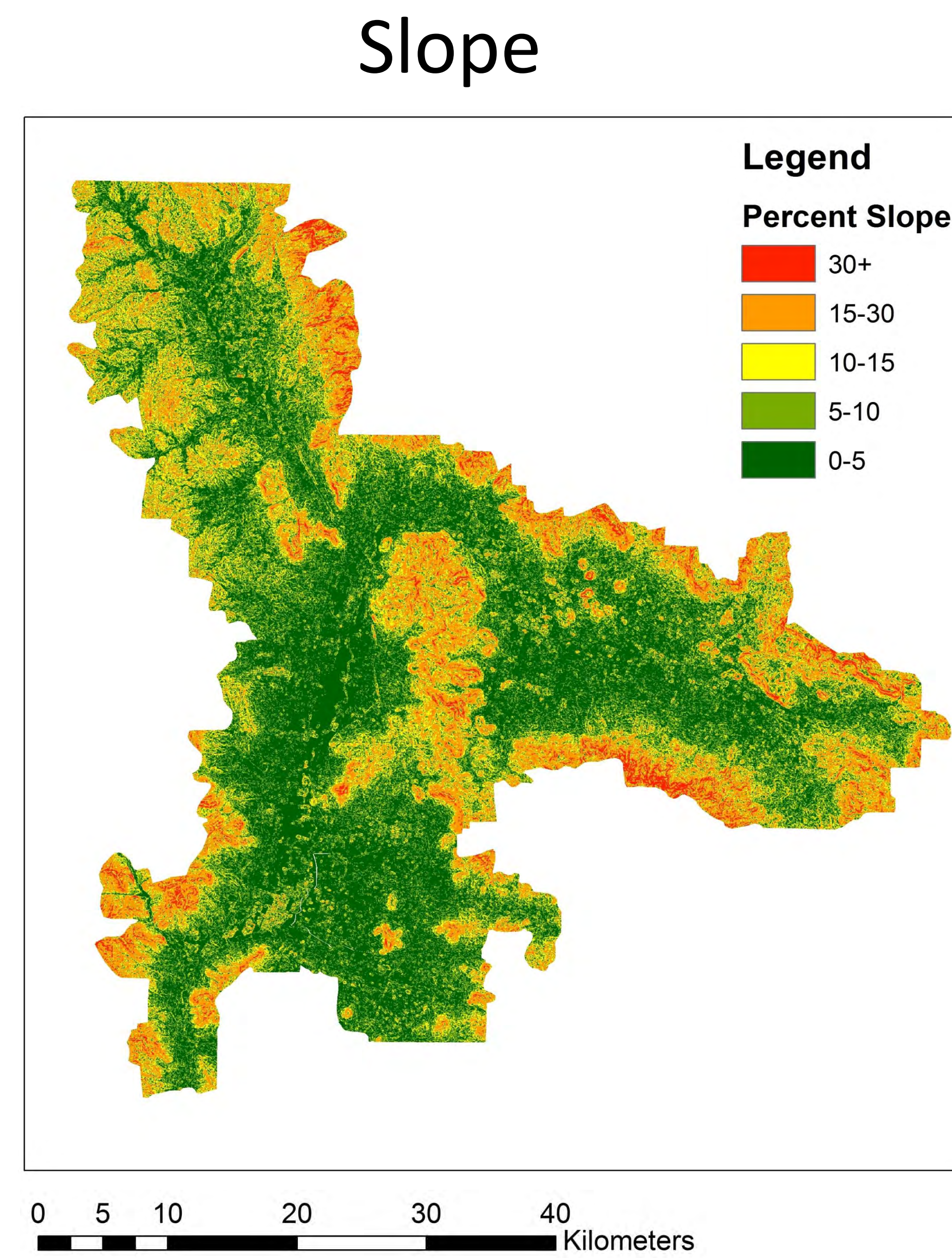
PREDICTIONS:
1. Close to water
2. Lower slope areas
3. Higher land quality
4. In view of city centers?

DATA SETS:
- Hand digitized maps (Feinman) → settlement polygons & rivers
- 30m DEM (ASTER)

Tierras Largas · Guadalupe · Monte Alban Early I · Monte Alban Late I · Monte Alban IIIA · Monte Alban IIIB · Monte Alban IV · Monte Alban V

Legend — Monte Alban · DEM High : 3783 Low : 2

Slope

Legend — Percent Slope
- 30+
- 15-30
- 10-15
- 5-10
- 0-5

Land Class

Legend
- Water
- Class I
- Class II
- Class III (100% arable)
- Class III (10% arable)
- Uncultivateable

Buffer Zones

Legend — distance from rivers (meters)
- 500
- 1000
- 2000
- 4000
- 20000

+ + =

Legend
1 · 2 · 3 · 4 · 5 · 6 · 7 · 8 · 9 · 10

Legend
- Monte Alban · Rivers
- **Viewshed**: Not Visible / Visible
- **DEM**: High : 3783 / Low : 2
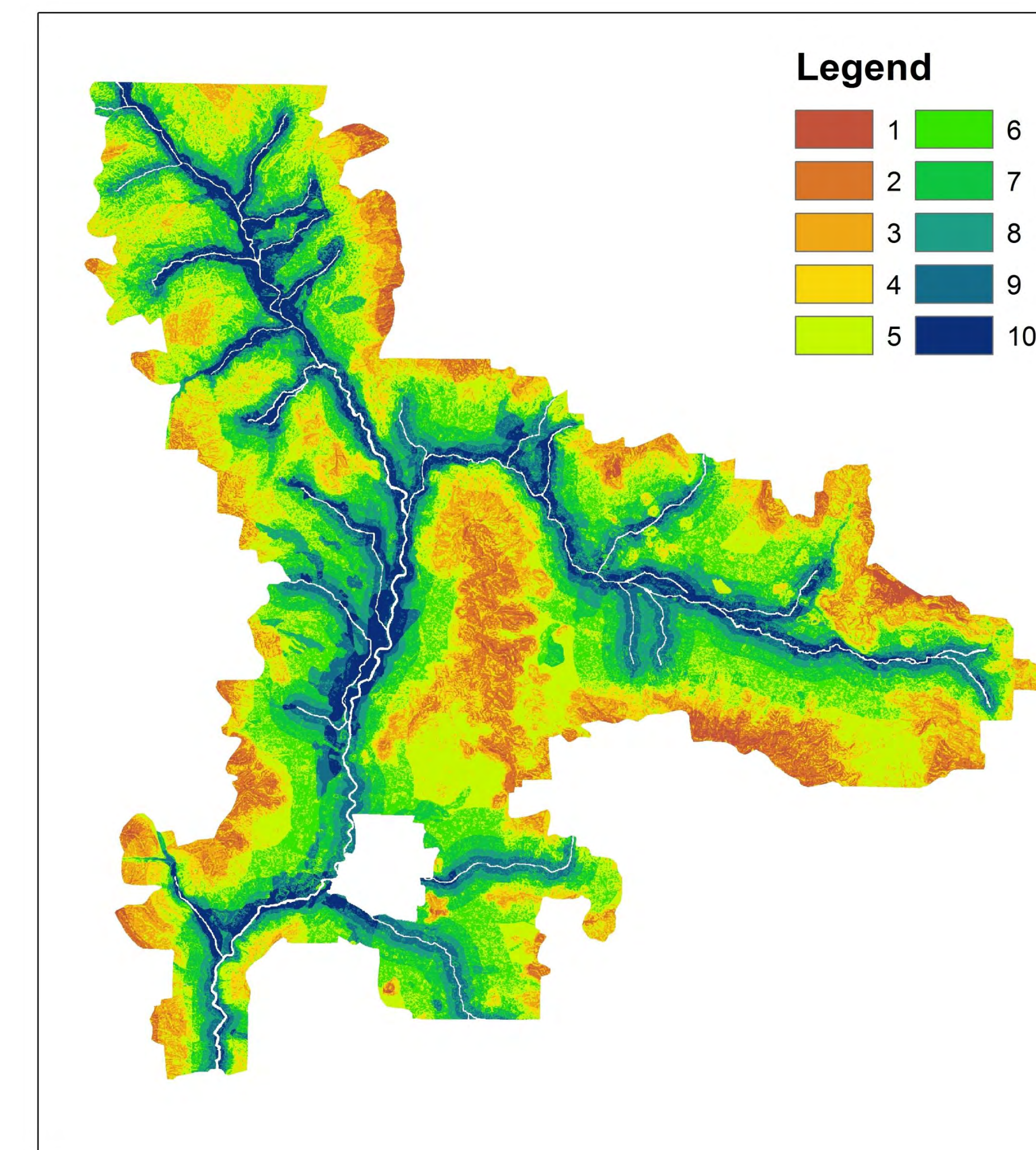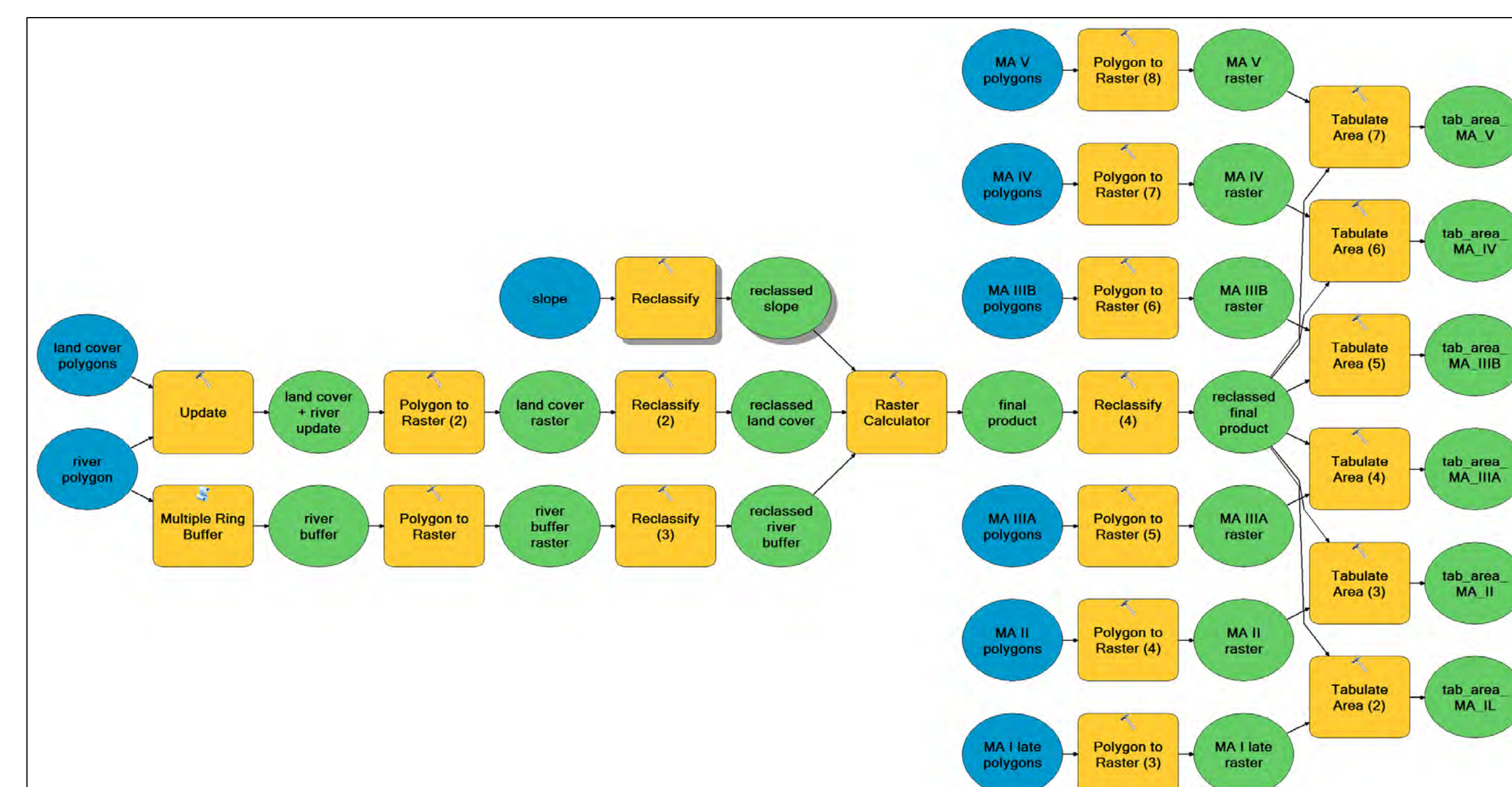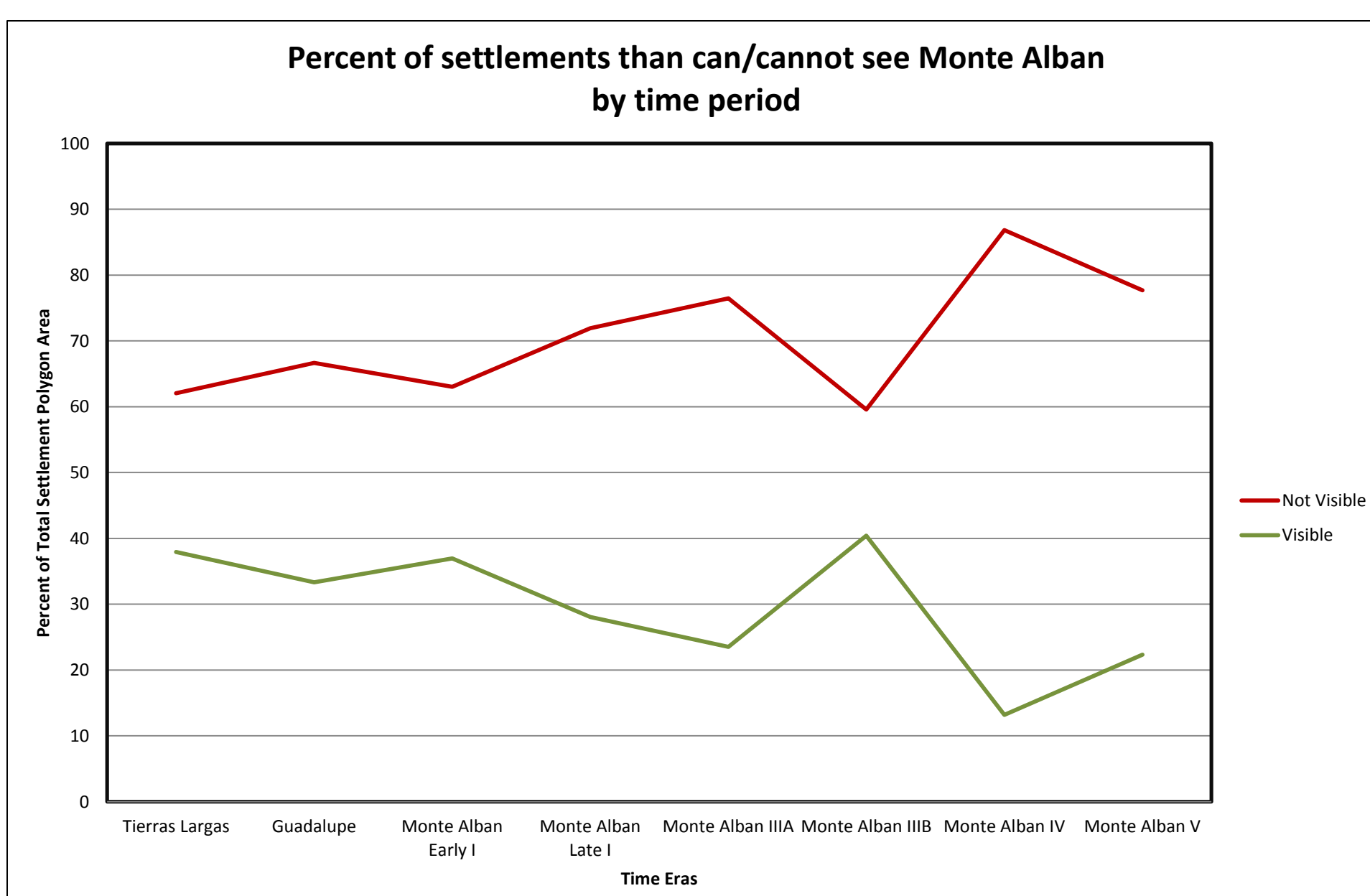
OFFSETA = 20M
OFFSETB = 1.5M

ANALYSIS (viewsheds):

Monte Alban, one of the major cities of Oaxaca, was built on top of a natural mountain top that was further flattened to allow for a complex city and temple to be constructed. Placing cities on "the high ground" is nothing new, as it provides a lookout point for defensive or offensive purposes, and to keep an eye on the surrounding land.

I was interested in looking at whether ancient settlers might have chosen to live in locations where Monte Alban would be visible to them, especially during the height of its power (MA IIIB). The left map shows a viewshed of Monte Alban, created using 28 points dispersed around the city. I chose primarily tops of large buildings and pyramids, as these would have been the most visible. Finding heights for these buildings is difficult, despite their well preserved state, so I gave them a blanket 20m height (a very conservative value; the Great Pyramid of Giza is about 139m). I also set the observed cells to an offset of 1.5m, the average height of a man.

As you can see in the graph (bottom left corner), visibility slowly decreased until during MA IIIB it suddenly spiked, before quickly dropping again. Given Monte Alban's prominence during this time, it would make sense that people should try to settle in view of their rulers (whether voluntarily or not is impossible to tell). During MA IV, when the visibility drastically decreases, Monte Alban had significantly decreased in power, and the city of Jalieza had risen to take its place.

Image Source:
http://fullmeltbubble.com/forum/showthread.php?355-The-Sunset-Thread!!!!

ANALYSIS (Land Quality Map):

The highest values in the left graph are the most valuable land for settlement, where one would expect the highest settlement to occur. The graph below displays the percent area covered by settlement polygons in each land class, for each time period. It shows that while for the first two phases (pre-city villages) most people lived in the highest quality land, during the later phases people shifted toward lower quality land. There is a marked peak during Monte Alban IIIB, with the highest percentage of settled land being in class 4. This period coincides with the height of power for the city of Monte Alban

CONCLUSIONS: While it is easy to assume that environmental factors such as distance from water, land cover quality and slope would be the main factors that determined where ancient people settled, that is clearly not the entire case. I explored viewsheds as one possible alternative, but there are many other possible factors as well; proximity to trade or religious centers, warfare and defense, etc. While we can never definitively *know* why people acted the way they did in the past, using GIS helps paint a clearer picture of what could have happened.

This model (left) shows most of the process for creating the land quality map (above), as well as the steps I took to create the graph at right. I used the Tabulate Area tool to find the proportion of settlements in each different land quality class, for each time era. I did the same with the viewshed raster layer, simply replacing it for the land quality raster.

Percent of settlements than can/cannot see Monte Alban by time period

Not Visible / Visible

Percent Settlement for each Value Class per Time Period

Tierras Largas · Guadalupe · Monte Alban Early I · Monte Alban IIIA · Monte Alban IIIB · Monte Alban IV · Monte Alban V

CITATIONS:
- Feinman, Gary et al. 1985. *Long-Term Demographic Change: A Perspective from the Valley of Oaxaca, Mexico.* Maney Publishing: Journal of Field Archaeology, 12.3. pp 333-362.
- Feinman, Gary & Marcus, Joyce. 1998. Archaic States. School of American Research Press. Ch 3.
- Flannery, Kent V & Marcus, Joyce. 2003. *The Origin of War: New 14C Dates from Ancient Mexico.* National Academy of Sciences: Proceedings of the National Academy of Sciences of the United States of America, 100.20. pp 11801-11805.
- Nicholas, Linda et al. 1986. *Prehispanic Colonization of the Valley of Oaxaca, Mexico.* Springer: Human Ecology, 14.2. pp 131-162.
- Spencer, Charles. 2003. *War and Early State Formation in Oaxaca, Mexico.* National Academy of Sciences: Proceedings of the National Academy of Sciences of the United States of America, 100.20. pp 11185-11187.