

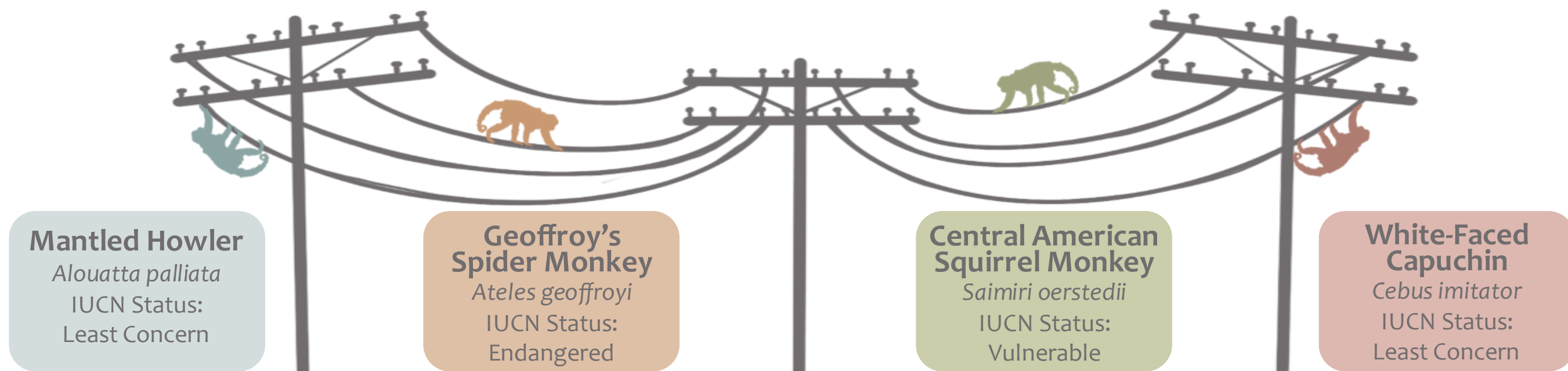
A Shocking Problem:

A Risk Analysis of Primate Electrocutions in Costa Rica

Climbing Into Trouble

Human development has introduced a unique series of threats to primates living in Costa Rica including electrocution by power lines. As humans clear away sections of forests and construct roads, fragmented patches of habitat are left behind. To adapt to these habitat gaps, primates use artificial structures, including power lines, to travel between forest fragments in search of food and new territory. However, a large portion of power lines in Costa Rica are uninsulated. So, when primates climb across them, the bare aluminum wires can send high voltage electricity through their bodies resulting in injury or death. This conservation crisis is a problem, not only for the primate populations being harmed, but also for Costa Rica's economy where the wildlife tourism industry accounts for 13% of employment and 8% of the country's Gross Domestic Product.

This analysis seeks to identify the areas of highest risk for primate electrocutions to better direct intervention efforts such as insulating existing power lines and installing alternative rope bridges for primates to cross. Additionally, this analysis uses the locations of electrocuted primates provided by the organization Kids Saving the Rainforest (KSTR) to assess the accuracy of the risk analysis.



Methods and Discussion

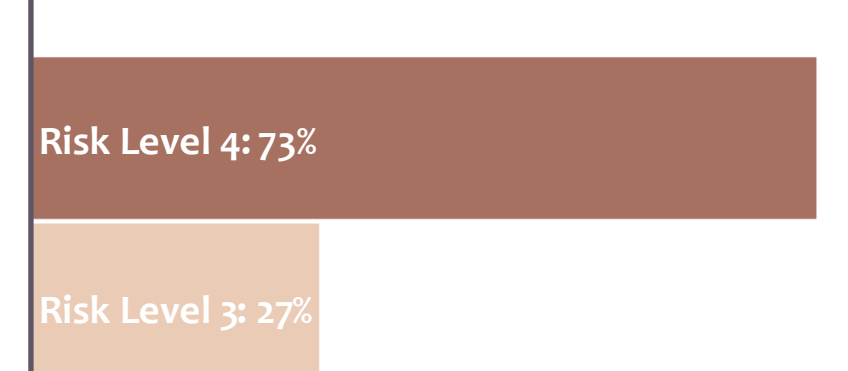
High risk areas for primate electrocutions were identified by performing a weighted risk analysis for factors that influence primate movement and risk of electrocution. The areas were ranked 1 to 5 with areas of low risk closer to 1 and areas of high risk closer to 5. Additionally, GPS locations of actual primate electrocutions, provided by Kids Saving the Rainforest, were layered on top of the risk analysis to assess its accuracy. The bar chart to the right demonstrates the number of real primate electrocutions that occurred in each risk level. The results showed that over 73% of the electrocution locations were in risk level 4 areas, validating the ability of the analysis to measure the level of electrocution risk. Kernel density was also run on the primate electrocution locations to identify the areas where larger numbers of primates were harmed. Roads pose the greatest electrocution risk because they encourage primates to use power lines as bridges to cross over them. Therefore, the road layer was given the heaviest weight during the risk analysis. The weights used in the raster calculator for each risk factor can be found in the following table:



Risk Factor Weight:

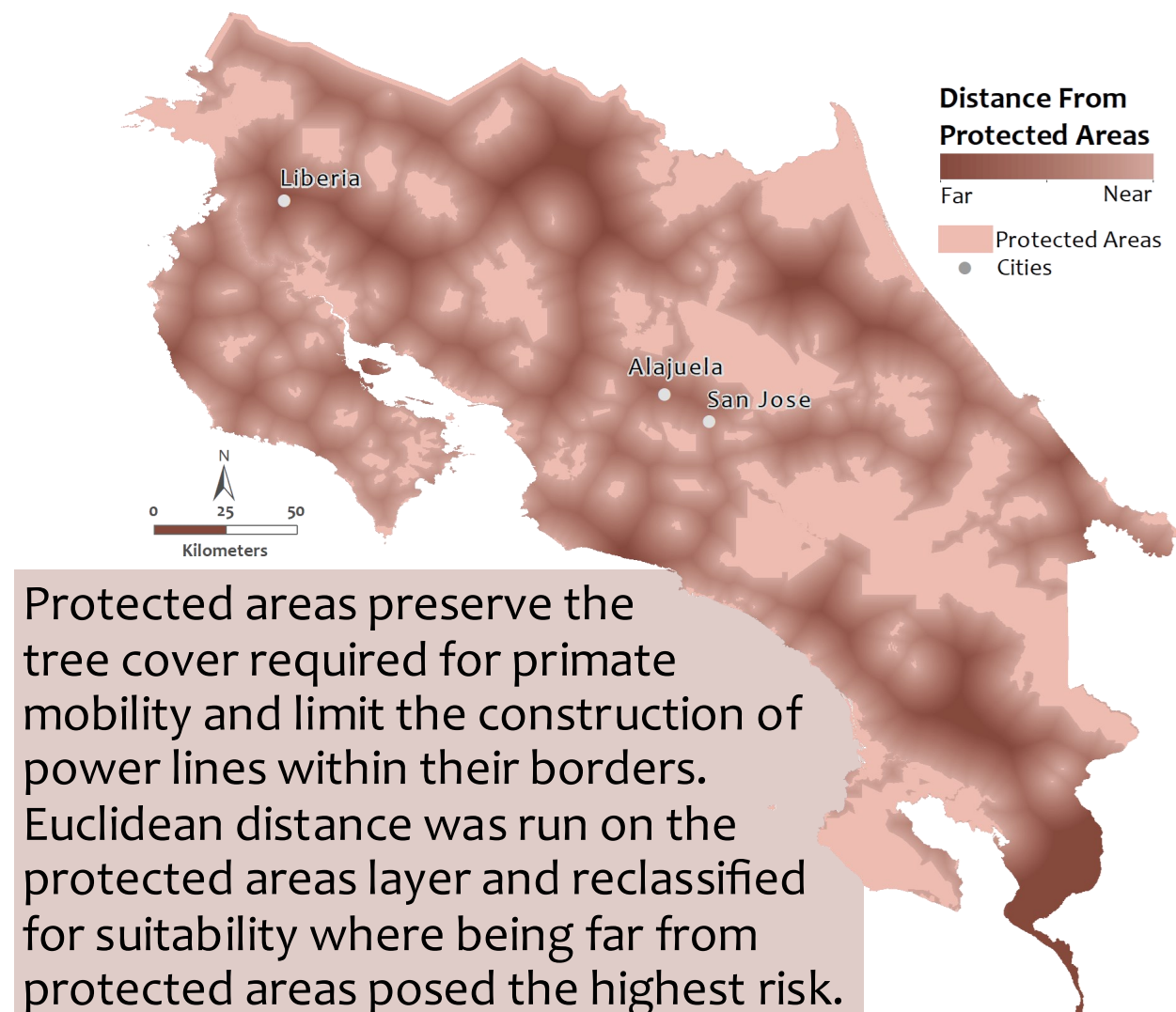
Distance from Roads	25%
Distance from Protected Areas	20%
Elevation	20%
Land Cover Risk Level	15%
Density of Primate Observations	10%
Distance from Tree Loss	10%
Human Population Density	5%

Percentage of Electrocutions in Each Risk Level

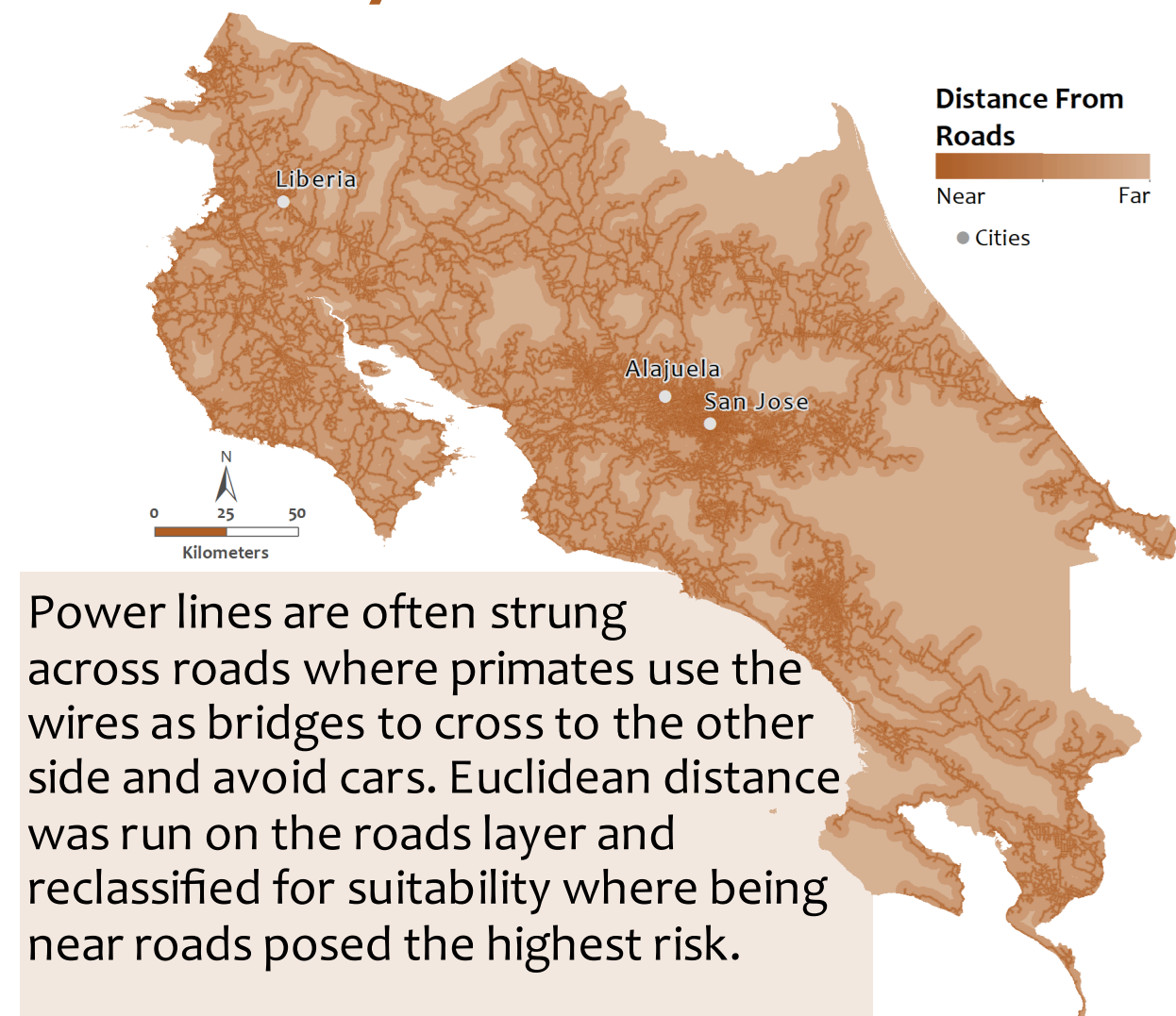


Suitability Factors

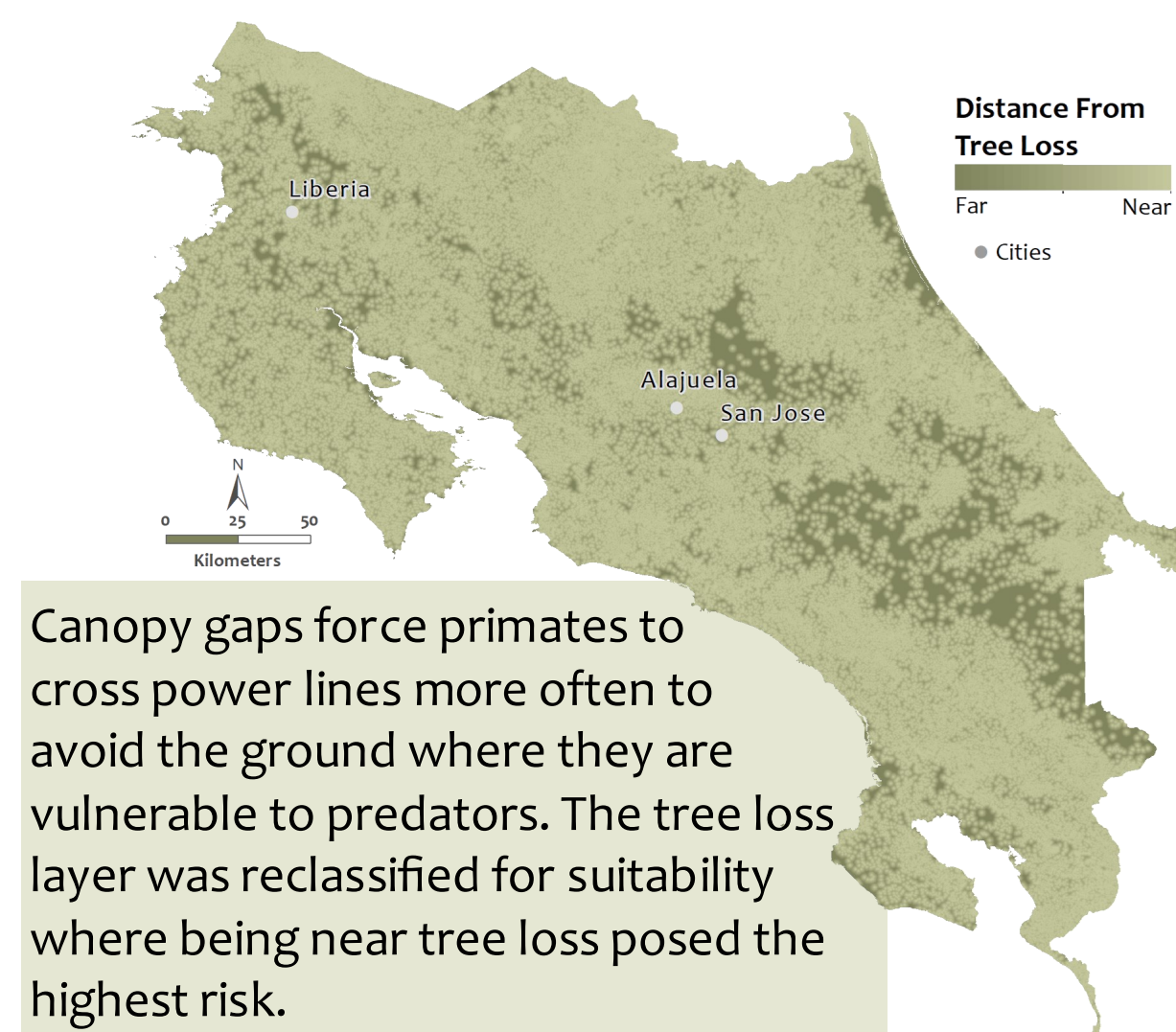
Protected Areas



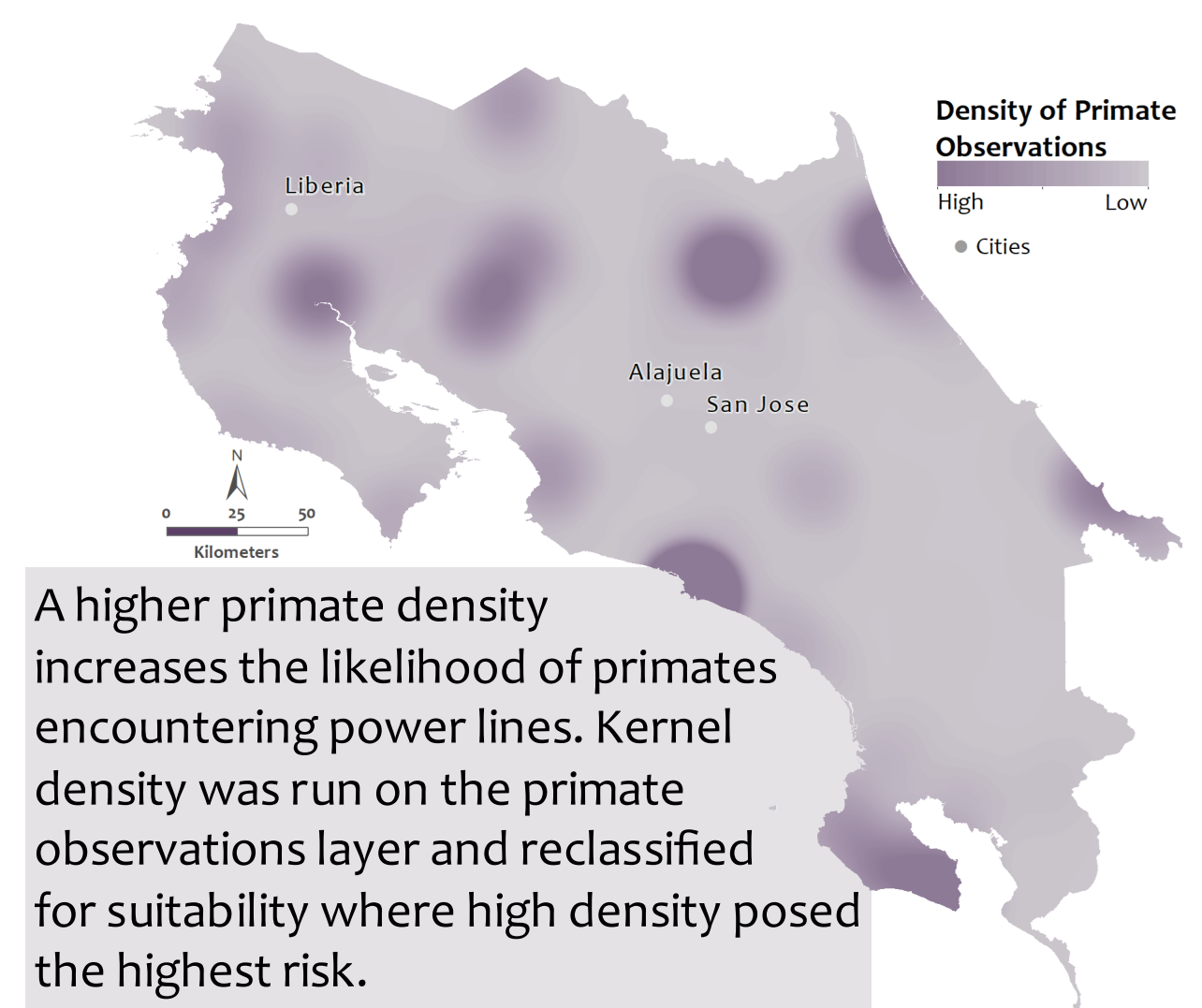
Roadways



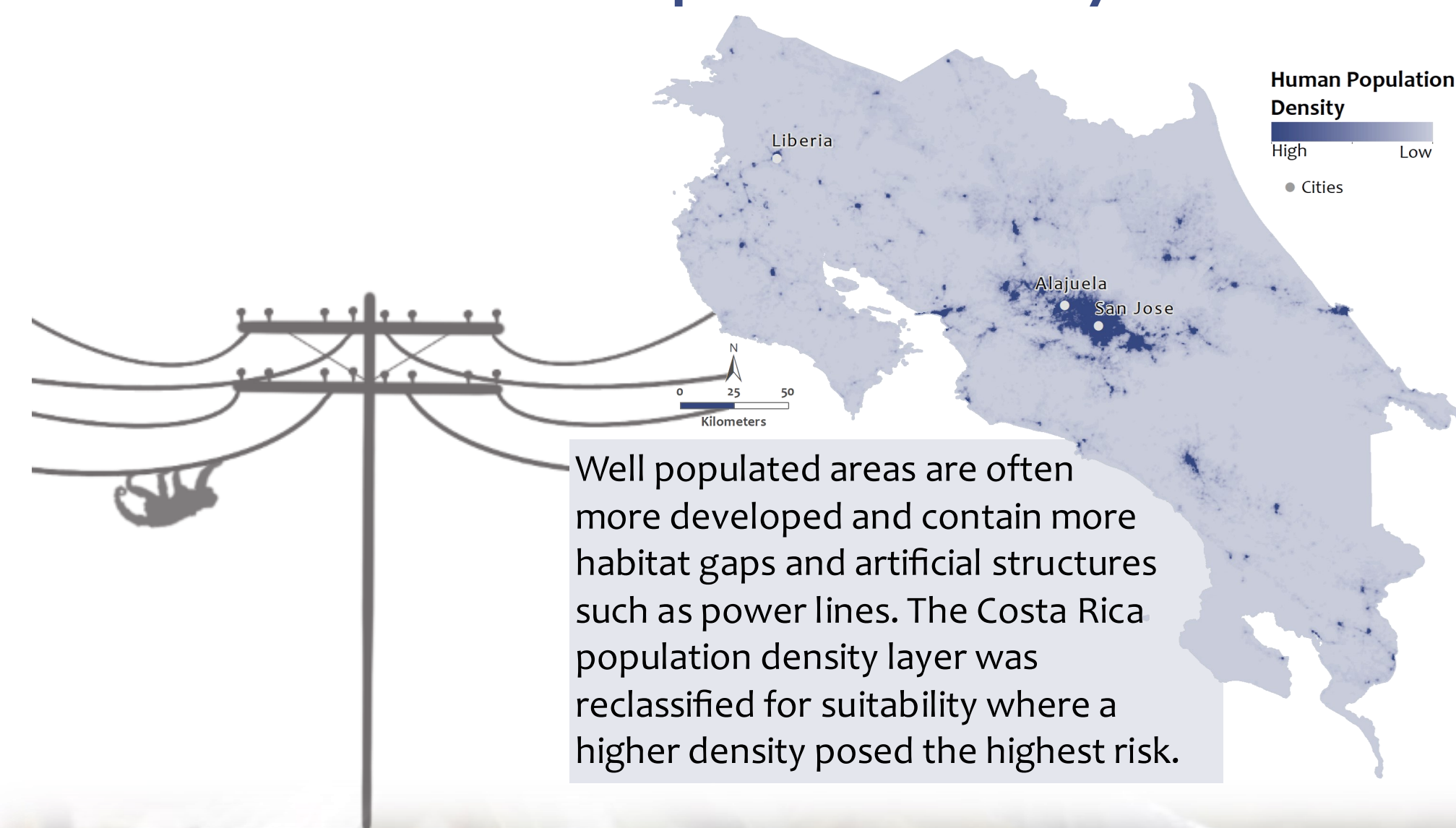
Tree Loss



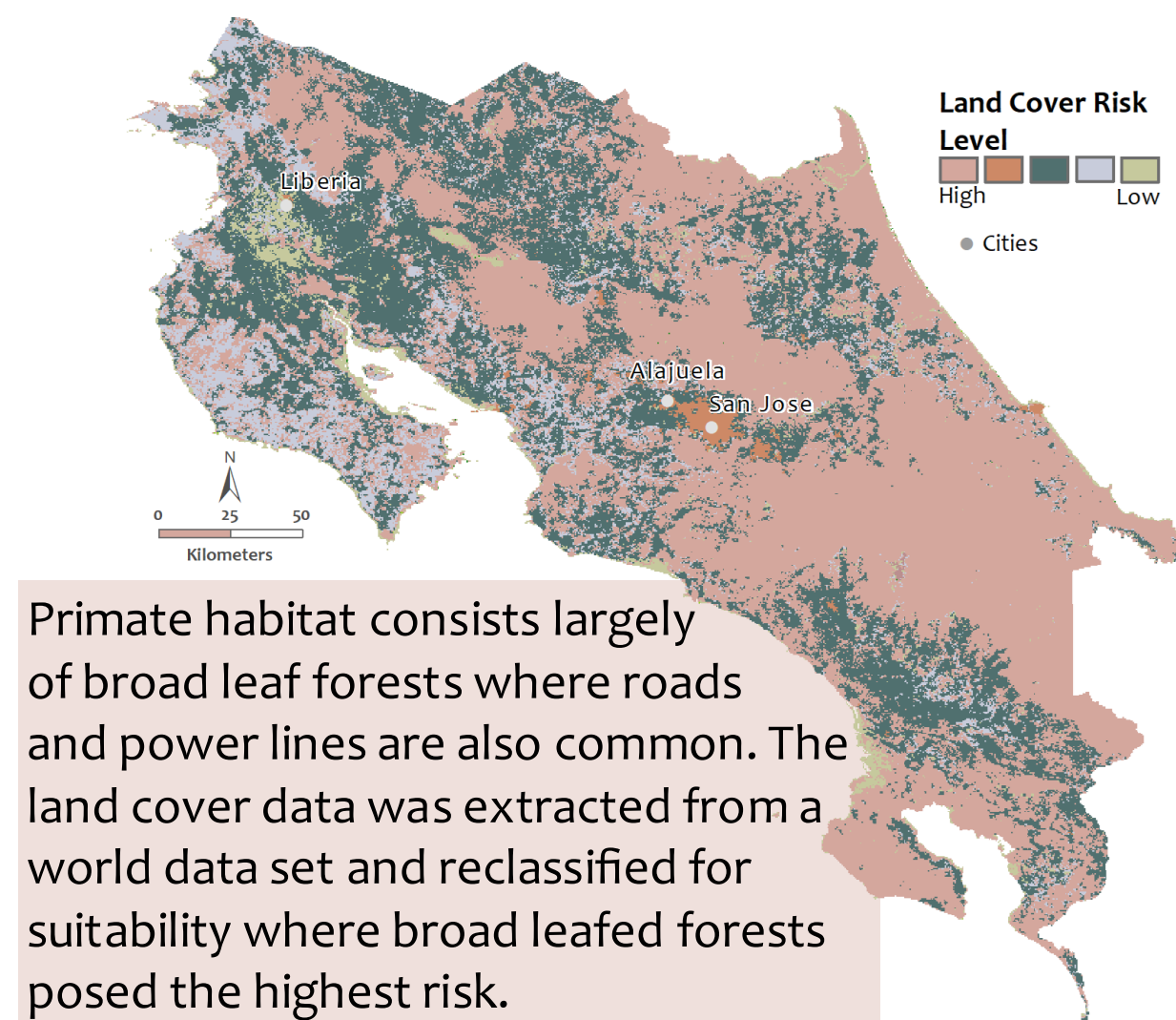
Primate Observations



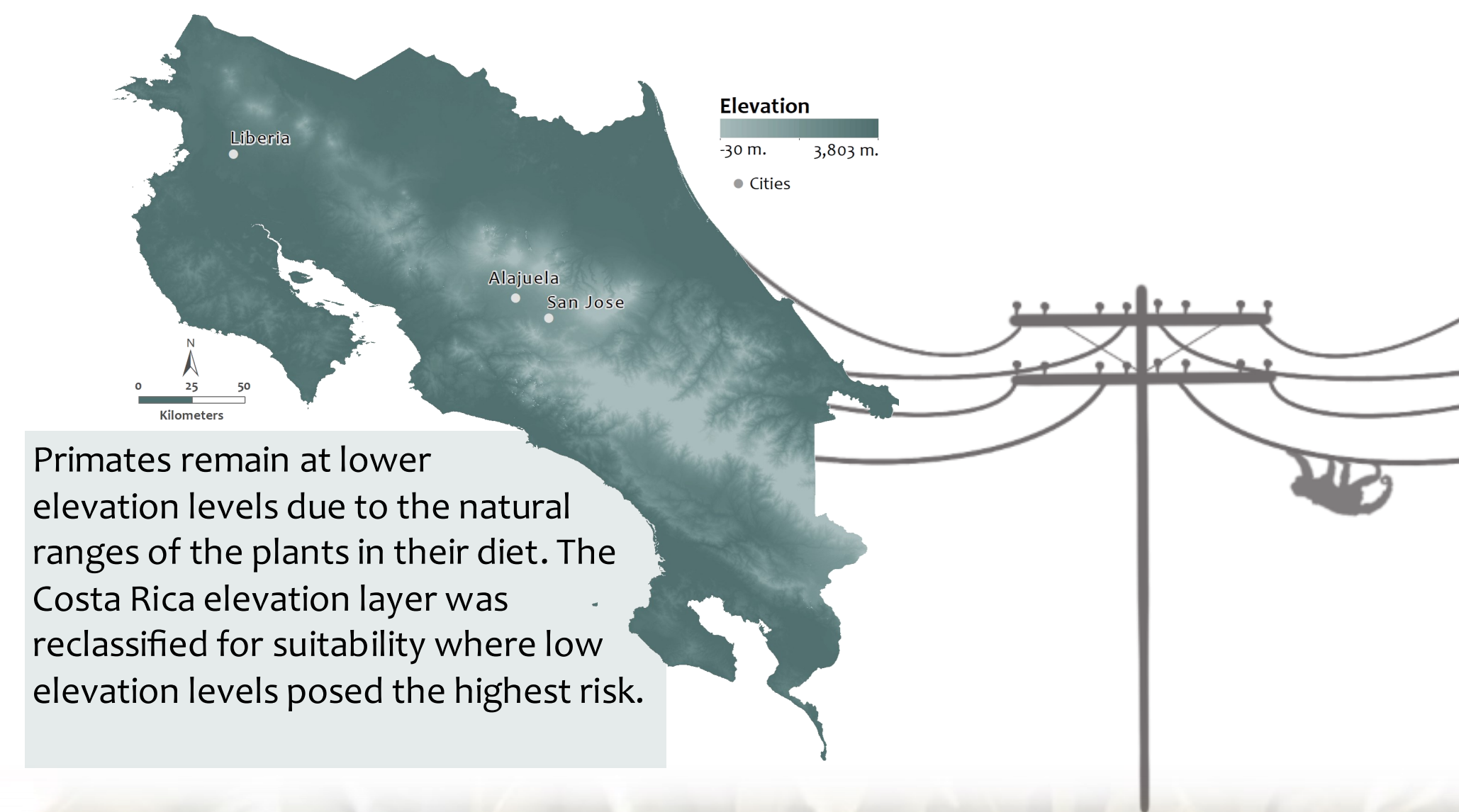
Population Density



Land Cover



Elevation



Tara Francis

GIS for Conservation Medicine

Projection: WGS 1984 Costa Rica TM 90

Data Sources: ArcGIS, Data Basin, Global Administrative Areas, Global Land Cover Facility, iNaturalist, KSTR, University of Maryland, WDPA.

All my thanks to Carolyn Talmadge for her endless wisdom and Kids Saving the Rainforest for their support and assistance!

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