Discovery Coast Atlantic Forest Reserves
Habitat Connectivity Corridor Analysis

Introduction

For my project I performed a habitat connectivity analysis of the Discover Coast Atlantic Forest Reserves (DCAFR) in Bahia and Espirito Santo. These 8 separate reserves contain 112,000 hectares of Atlantic Forest, which contain some of the richest biodiversity on the planet. However, these pockets of thriving, diverse animal life are in danger. The DCAFR has been designated a site of High Concern by the World Heritage Outlook. The DCAFR suffer from a lack of buffer zones and from being so small and scattered. This has allowed development to grow around the reserves, to the great detriment of biodiversity within the parks. The primary threat to biodiversity within these reserves is bioisolation. Because the reserves are so small and spread out, with so much developed land cover between them, connectivity between them is very low. This means that it is harder for animals to travel back and forth between the reserves, which limits reproduction and causes increased stress on the separate populations.

To investigate ways to help address this problem, I wanted to analyze potential habitat connectivity corridors between the reserves. Originally, I planned on generating a map of core least cost corridor areas using an open source software called Linkage Mapper. However, after over a week trying to get the software to work, I decided to just generate least cost paths between the reserves.

Methodology

My methodology was fairly simple. My primary task was to create a data layer that would accurately convey the ease of travel for animals in areas around the reserves. To do this, I first had to determine what relevant factors I could use to generate this data. I used a land cover data that I reclassified to show most ideal habitation areas. Areas classified as urban, agriculture, or barren received high resistance values. Roads act as barriers to habitat connectivity. To represent this, I created a Euclidean Distance raster showing values within 200 meters with very high resistance. Lastly, using an elevation raster layer I created a raster showing slope, with high slope areas having high resistance. I then combined these rasters, weighting roads twice as heavy, to form a final resistance raster, which I clipped to the area of interest.

My intention was use this raster and a shapefile of DCAFR boundaries as inputs for the Linkage Mapper software. After extensive troubleshooting, including emailing my data directly to one of the Linakge Mapper programmers, I decided instead to create a Least Cost Path. In order to accomplish this, I generated a Cost Distance raster and a Back Link raster from my Final Resistance Map. Using these rasters and the reserve boundaries, I was able to generate a shapefile of paths showing where habitat connectivity is greatest between the reserves.

References

Projection: WGS_1984_UTM_Zone_24S

Sources: Global Land Cover Facility 2014, Geocommunity 2014, World WIldlife Foundation 2015

Tufts UNIVERSITY

Emery Reifsnyder
GIS 101
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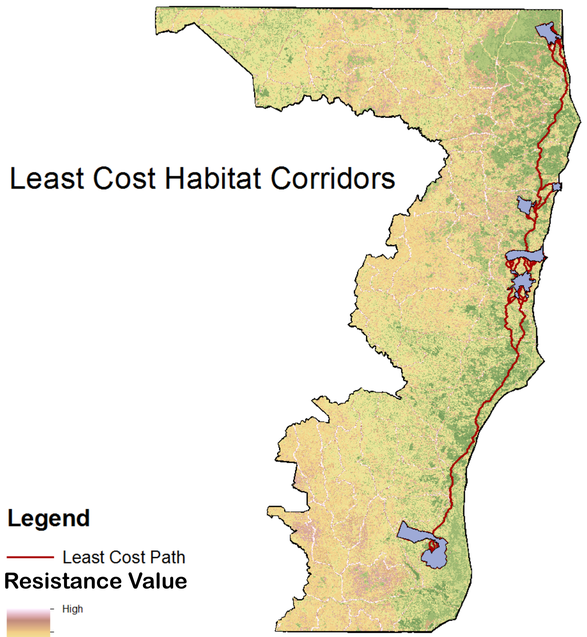
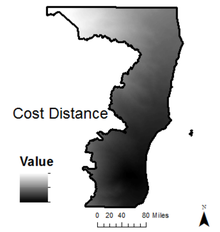
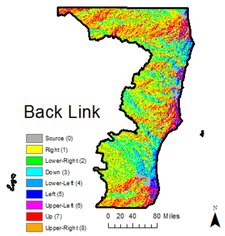
Tufts University Geographic Information Systems

Results







Conclusions & Limitations

My inability to utilize Linkage Mapper seriously altered the course of my project. However, using the Least Cost Path tool, I was able to successfully generate a series of Least Cost Pathways between the reserves. This information is nearly as valuable as the Least Coast Corridors, and highlights key areas in the region of interest that need special attention and conservation.

Just based on the Land Cover Preferability map that I generated, it is evident that habitat fragmentation is a serious threat to the biodiversity of the flora and fauna within the DCAFR. The reserve to the south appears to be at special risk because of its increased distance from the other reserves and more thorough habitat destruction in their vicinity. Biodiversity is probably more likely to flourish in the four reserves in the middle, a fact represented by the increased amount of Least Cost Paths between them.

Further Research and Action

Biodiversity within reserves flourishes when small reserves increase in size or gain a buffer zone to shield them from human development. Though neither of these may be options based on the expansive amount of development that has surrounded the DCAFR, this analysis could be a good basis for further conservation action. The Least Cost Pathways I generated highlight vital habitat connectivity areas. Using this information, park administrators or conservationists can focus their conservations efforts on the corridors that are most important for preserving the biodiversity within the DCAFR. Focusing conservation on narrow, specific paths could be a way to allow human development while increasing connectivity. In addition, this analysis could be useful for determining the optimal location to make an expensive connectivity intervention, such as constructing a land bridge over a highway.