Effect of Proximity to Urban Areas on Animal Species Diversity

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Introduction

It is known that animal species diversity is lower directly within urban areas such as cities (McKinney, 2006). There have also been many studies that have found positive correlations between habitat heterogeneity and animal species diversity (Tews et al., 2003). Meaning that urban areas may contribute to habitat diversity and therefore animal species diversity in areas that surround these urban areas. Though, the expansion of these urban areas destroys natural habitats for many species and is the largest threat to animal diversity in the areas surrounding the expansion (Murphy, 1988). Even with this, it is not known whether general proximity to large cities or urban areas influences overall animal species diversity.

Is there a difference in animals species diversity in areas that are closer to and farther from relatively large cities? I hypothesized that species diversity will be lower in an area that is closer to a large city and that an area farther away from that same city will have a greater animal species diversity.

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Methods

To test diversity as it relates to proximity to urban areas, we used a dataset of previously recorded camera trap data from the WildCam Lab database. This data was collected by multiple camera traps in two national parks within Panama. Soberania national park (25km from Panama City) and Darien national park (325km from Panama City). After downloading the data set containing the total consensus of species seen from each camera trap, we imported it into R Studio. There we split the data into two subsets each containing one of the two parks' data. We then used the vegan package to calculate the Shannon diversity index for each park and used the ecoltest package to compare the diversity indexes with a Hutchesons t-test.

P.C. https://englishandfunblog.blogspot.com/2018/01/all-about-animals-classes-5a-and-5b.html

Results

Both parks vary in what taxonomies are most abundant as shown in figure 1. Darien national park had the highest abundance of birds (including Great Tinamous, Crested Guans, Great Curassows, etc.) whereas Soberania national park had an incredibly low abundance of birds. Small mammal (including Giant Anteaters, Opossums, Porcupines, etc.) totals were the most similar for both parks.

The Shannon diversity indexes for Soberania and Darien national park were 2.694 and 3.603, respectively. Therefore, Soberania national park has lower diversity than Darien national park. After comparing the two diversities with the Hutcheson t-test, we received a p-value of 2.2e-16 meaning that the difference in diversities between the parks is great enough to be statistically significant to reject our null hypothesis.

Figure 1 – taxonomy totals by park
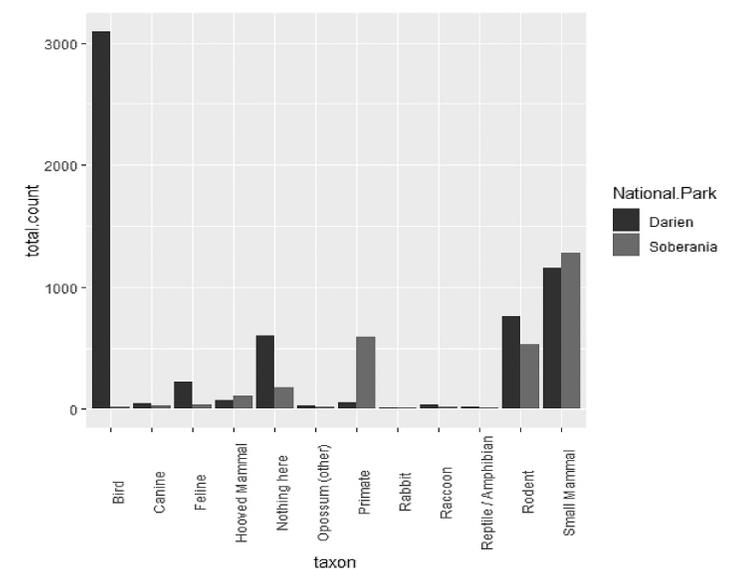
Conclusions

Because of our p-value, we can conclusively say that animal species diversity is reduced closer to urbanized areas despite any habitat heterogeneity those urban areas may provide. Replicating this project at different locations around the globe would better tell us whether this difference in diversity is true for all habitats around urban areas or only specific locations.

This knowledge will allow researchers with interest in locations with high animal species diversity, to know that choosing a more remote location will have the highest animal diversity.

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