Environmental Factors Influencing Bird Abundance in the Himalayas: Data Analysis and Visualization Using RStudio

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Introduction

Our study aimed to examine the factors influencing bird abundance in the Himalayas. We analyzed data from various sites using RStudio and its packages to identify why certain bird species thrive in specific environments. Our findings initially revealed that bird abundance increased with elevation up to a certain point; however, we quickly discovered that bird abundance was more closely related to precipitation levels.

Guiding Question

What are the ideal and most influential environmental factors for high bird abundance in the Himalayan mountain ranges?
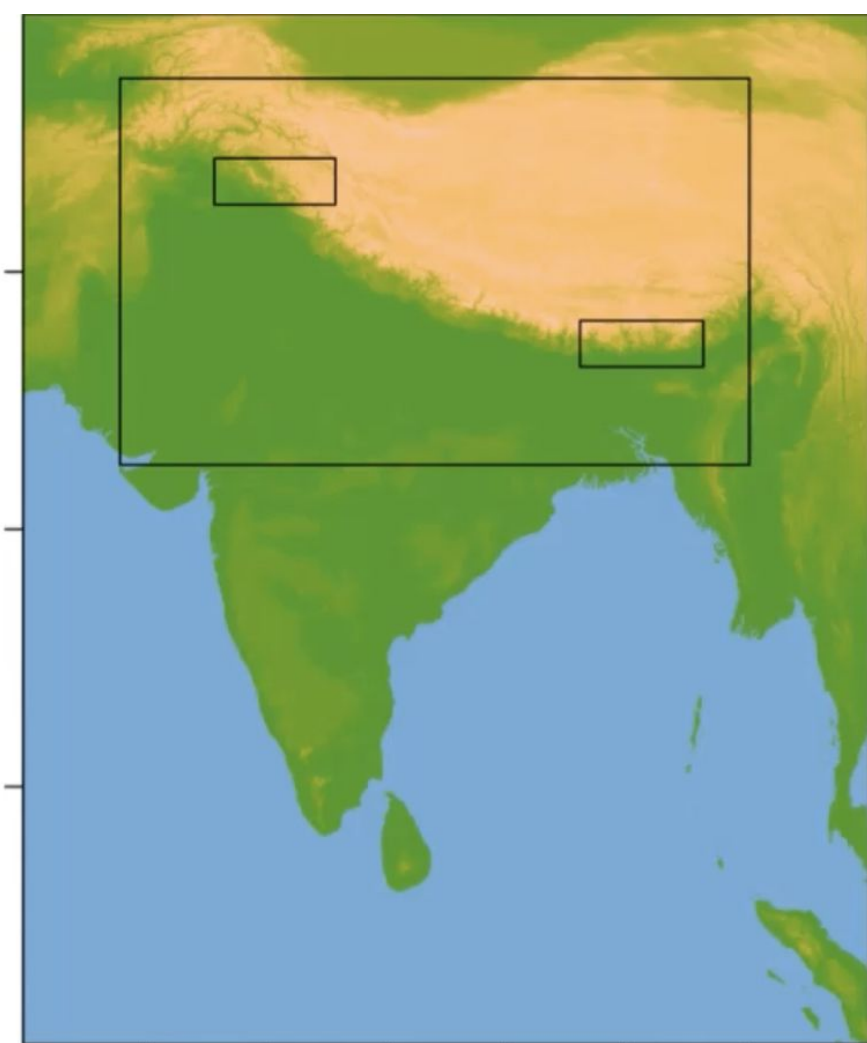

Tools and Software

We used RStudio for data analysis and visualization, utilizing packages like dplyr for manipulation and ggplot2 for plotting. The data was cleaned and summarized to explore the relationship between environmental factors and bird abundance.

Data Tidying

- R Code - Tidying Two Datasets

Bird Abundance Data

Himalayan Forest Metadata

- First, we made our data tidy!
  - Tidy datasets should share column names for shared variables
  - rename()
  - After this, our data is now tidy!

```r
birds <- birds %>%
    rename(grid = ...1) #rename to grid
```

- Then, we summed every bird observation for each site by using the following functions.
  - rowwise()
  - mutate()
  - sum()
  - New column: "bird_abundance"

- This will tell us the relative abundance of birds in a given site

```r
bird_sum <- birds %>%
    rowwise() %>%
    mutate(bird_abundance = sum(c_across(-grid), na.rm = TRUE)
    #sum of birds observed in each site
```

Results and Conclusion

- Ideal conditions for bird abundance in the Himalayas are characterized by approximately 2200 mm of precipitation, typically found at elevations of around 2.5 km. This information also explains why the East appears to have a greater abundance of birds.
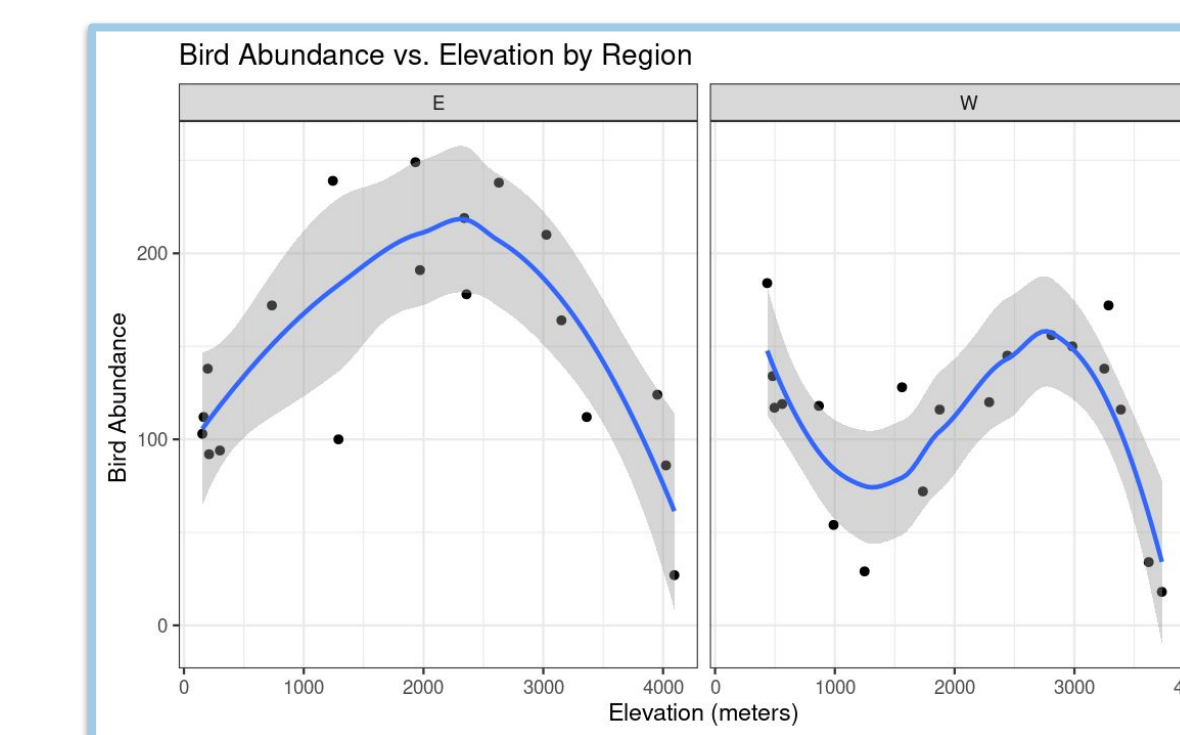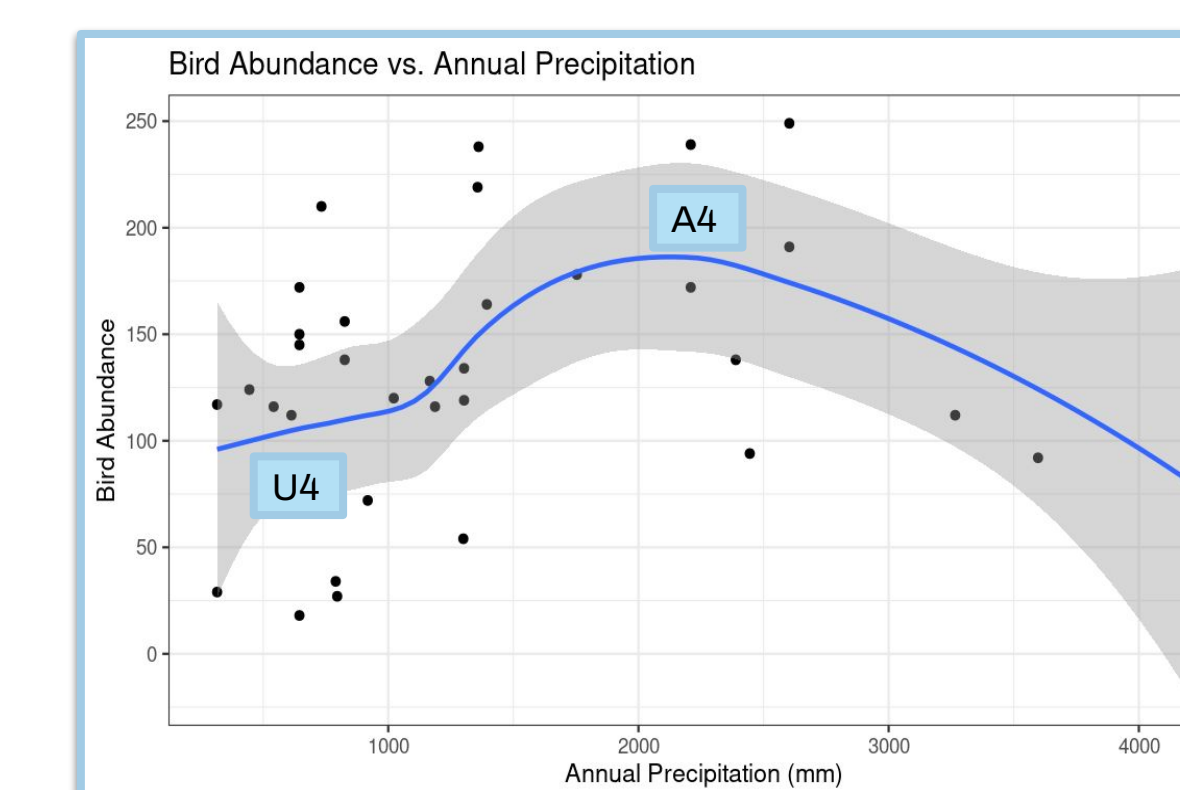

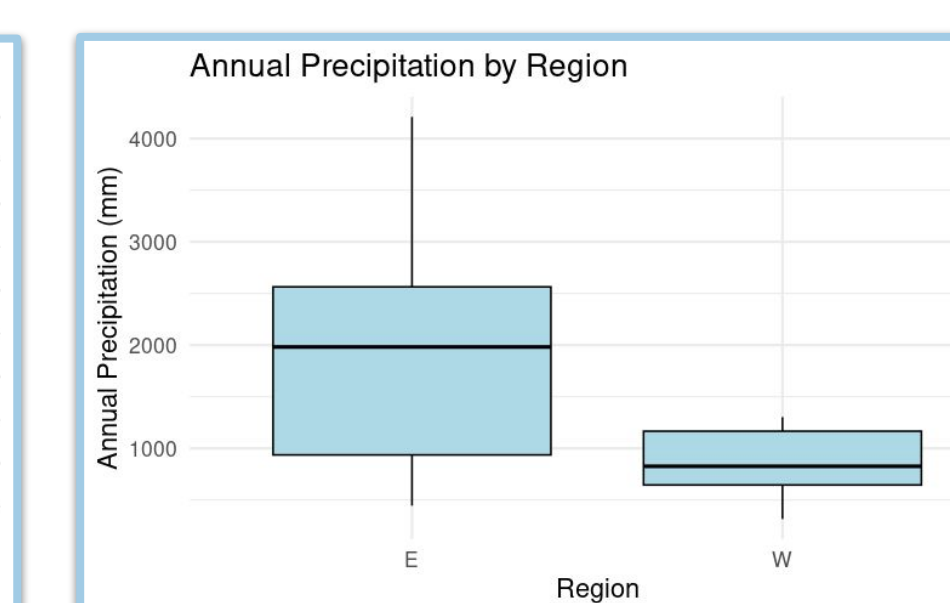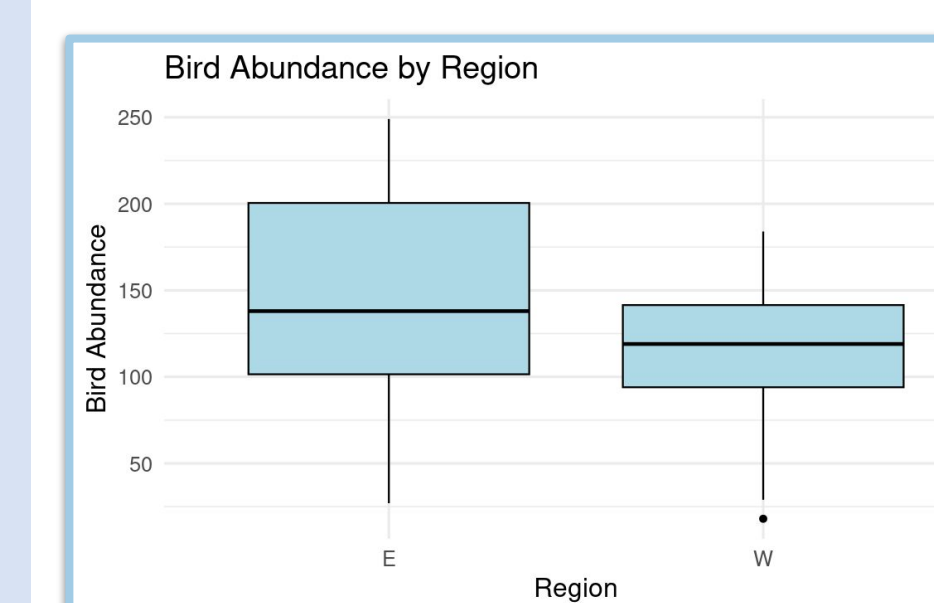- Note the two peaks on each respective plot as well as the drops
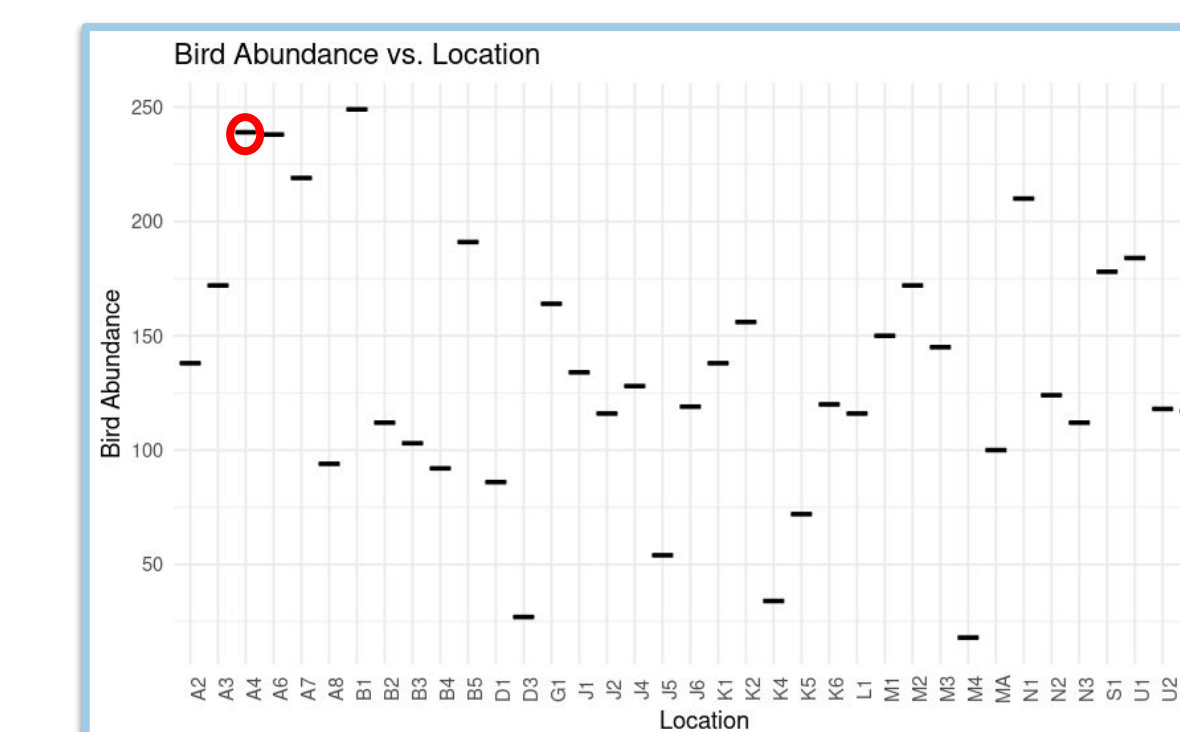
- However, our data contains outliers.

- A4 (East): Elevation ⇒ 1243.3 m
- U4 (West): Elevation ⇒ 1248.0 m

- Note the precipitation values
  - A4 - 2209 mm
  - U4 - 316 mm

- Judging by the two charts above, we concluded precipitation to be an indicator of greater bird abundance.

Applications Outside of Environmental Sciences

The data analysis and visualization techniques used in this study are applicable across a wide range of fields. One can use RStudio and packages like dplyr and ggplot2, to create visualizations that can be applied to:

- **Data Science**: Identifying trends and patterns in large datasets across various industries like business, healthcare, technology or even sports..
- **Economics**: Analyzing financial data or market trends.
- **Social Sciences**: Examining relationships between demographic factors and outcomes in studies involving human behavior or social trends.
- **Engineering**: Optimizing processes by analyzing system performance and environmental variables.

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Contact

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