

Analyzing Biodiversity and Human Impact through Spatial Data

Research Purpose

Biodiversity is the natural world around us, and the variety of all of the different kinds of organisms - the plants, animals, insects and microorganisms that live on our planet. Every one of these live and work together in ecosystems to maintain and support life on earth, and exist in delicate balance. So, biodiversity is essential for life. The loss of biodiversity can significantly harm the sustainability of life. Therefore, understanding biodiversity and addressing the damage caused by human activities are crucial for ensuring the continuity of life. Urbanization, industrial activities, and agriculture are major drivers of biodiversity decline, leading to habitat loss, pollution, and resource depletion. The objective of this project is to investigate the impact of human activities on biodiversity in the Marmara Region of Turkey. By utilizing data sets and geographic visualizations, this study focuses on the Marmara Region, one of Turkey's most significant and prominent areas in terms of industrial activity. The aim is to prioritize conservation efforts within this region.

Methods

Python will be used in this study to analyze and visualize the data utilizing spatial analysis techniques. The workflow will include:

1. Data Sources

- Biodiversity data from the Global Biodiversity Information Facility via its API, filtered for the Marmara Region of Turkey (<https://www.gbif.org/>).
- Human impact data from the Global 100m Terrestrial Human Footprint (<https://datadryad.org/>).
- Geographic boundaries from Natural Earth for contextual mapping (<https://www.naturalearthdata.com/>).

2. Data Access

- Data from GBIF will be accessed using the `pygbif` Python library.
- The Human Footprint dataset will be downloaded in shapefile format and processed with GeoPandas.

3. Data Analysis

- The data will be cleaned using Pandas to transform it into a processable format.
- The CRS of the datasets will be checked using GeoPandas, and if necessary, the datasets will be transformed into a common CRS.
- Correlation and regression analyses will be conducted to determine the impact of human activities on biodiversity loss. Perform correlations and regressions using GeoPandas.
- Using the Folium framework, combine human impact and biodiversity loss within the Marmara Region on a single map to show the overlap between the data.