Carbon Footprints

Introduction

Every person, community, and country contribute to a change in ecosystems and climate through an 'ecological footprint'. An ecological footprint is a measure of how much a person, community, or country affects the biosphere, hydrosphere, and atmosphere through their daily activities. Every single activity impacts the biosphere, hydrosphere, and/or atmosphere in some way and because of this impact, it is essential that we understand how to minimize harmful impacts from ecological footprints.

One of the current concerns that humans are facing is an increase in global temperatures. Even a 1.5° Celsius change in average global temperatures could lead to catastrophic results, which led 195 nations to come together in late 2015 to sign the Paris Agreement[1]. As part of the Paris Agreement, nations agreed to combat climate change by tackling known climate change contributors, such as greenhouse gases, or gases that trap heat in the atmosphere[2]. Of the many greenhouses gases, there is one atom that is known to be a problem: carbon.

Due to its atomic structure (4 valence electrons), carbon is rarely found in the atmosphere by itself; rather, the molecules that most concern scientists are carbon dioxide (CO_2) and methane (CH_4). These two gases are responsible for 92% of greenhouse gas emissions in the United States in 2017, with carbon dioxide alone accounting for 82% of emissions[2]. Given the large percentage of carbon emissions, it is important to understand where these emissions come from so that we are better able to reduce these emissions (also known as a carbon footprint).

Problem

Can a country's carbon footprint be predicted by its other footprints (cropland footprint, grazing footprint, forest footprint, buildup land, and fish footprint)?

Stakeholders

Stakeholders here consist of environmental regulatory agencies within each country as well as environmental watch groups.

Data

The data set used was composed by the National Footprint Accounts, and measures the ecological resource use and resource capacity of nations from 1961 to 2016[3]. This data set is based on calculations of data from several United Nations data sets, including data sets published by the Food and Agriculture Organization, United Nations Commodity Trade Statistics Database, the United Nations Statistics Division, and the International Energy Agency.

The dataset consists of 72,186 observations from 1961-2016, with multiple observations per country per year. The 12 columns contain country, year, country_code, record, and columns with individual footprint measures for each country in global hectares (gha) per person (crop_land, grazing_land, forest_land, fishing_ground, built_up_land, carbon, total). The last column, q score, is a data accuracy score assigned by the National Footprint Accounts that is based on the omission of unreliable data.

Data Processing

The first steps in data processing will be to analyze any empty values. The next step will be to remove the q score column as it does not pertain to the analysis. Finally, the individual footprints measures will be analyzed for trends, then used to determine if carbon footprints can be predicted.

Deliverables

❖ Slide deck
❖ Code
❖ Carbon Footprint Report

References

[1] "What Is the Paris Agreement?" *UNFCCC*, United Nations Climate Change, unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement.

[2] "Overview of Greenhouse Gases." *EPA*, Environmental Protection Agency, 11 Apr. 2019, www.epa.gov/ghgemissions/overview-greenhouse-gases.

[3] "NFA 2019 Edition - Dataset by Footprint." *NFA 2019 Edition*, Data.world, 2 July 2019, data.world/footprint/nfa-2019-edition.