

Agriculture and Carbon Emissions Project

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[Room 6]

Problem Statement

The goal is to measure disproportionate effects of climate change using a food security index coupled with Greenhouse Gas (GHG) emissions by country through time, while comparing greenhouse gas emissions and sectors to view which is most impactful.

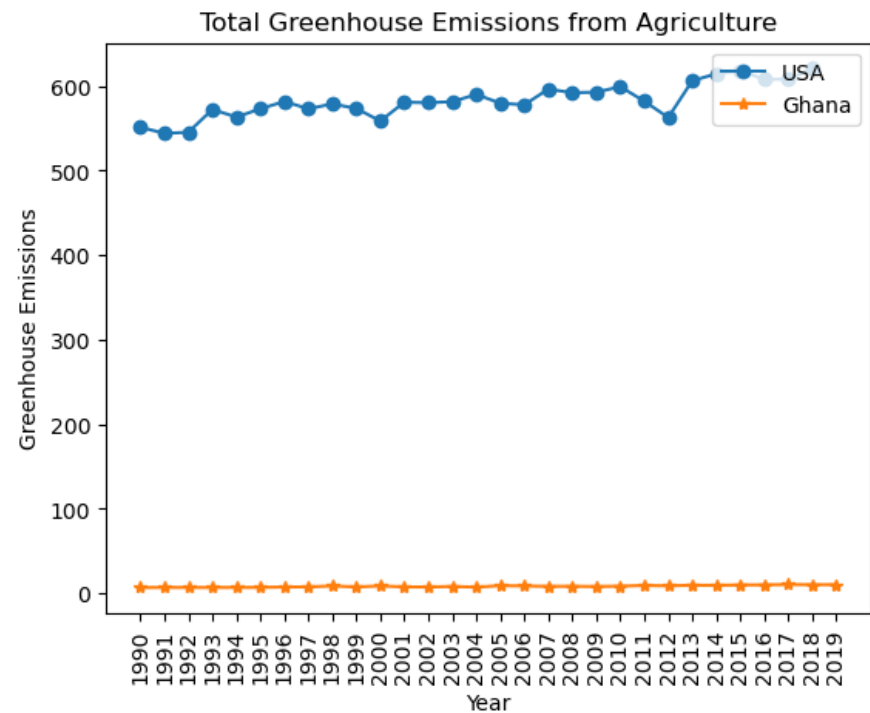
- Research Question: When comparing the United States and Ghana, if carbon emissions aren't reduced, would agricultural productivity decrease?
- Alternative Hypothesis: There is statistical significance between agriculture and carbon emissions between the United States and Ghana.
- Null Hypothesis: There is no statistical significance difference between agriculture and carbon emissions between the United States and Ghana.

Data Collection and Sources

- Data was collected from some of the following sites:
 - World Bank Gas Emissions
 - Food security data by FOA <https://www.fao.org/faostat/en/#data/FS>
 - <https://www.kaggle.com/usda/crop-production>
 - <https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?view=chart>
- Key data points:
 - Historical Emissions
 - Historical Land Usage
 - Timeframe (years)
 - Food Security
 - Crop Production
 - Sector

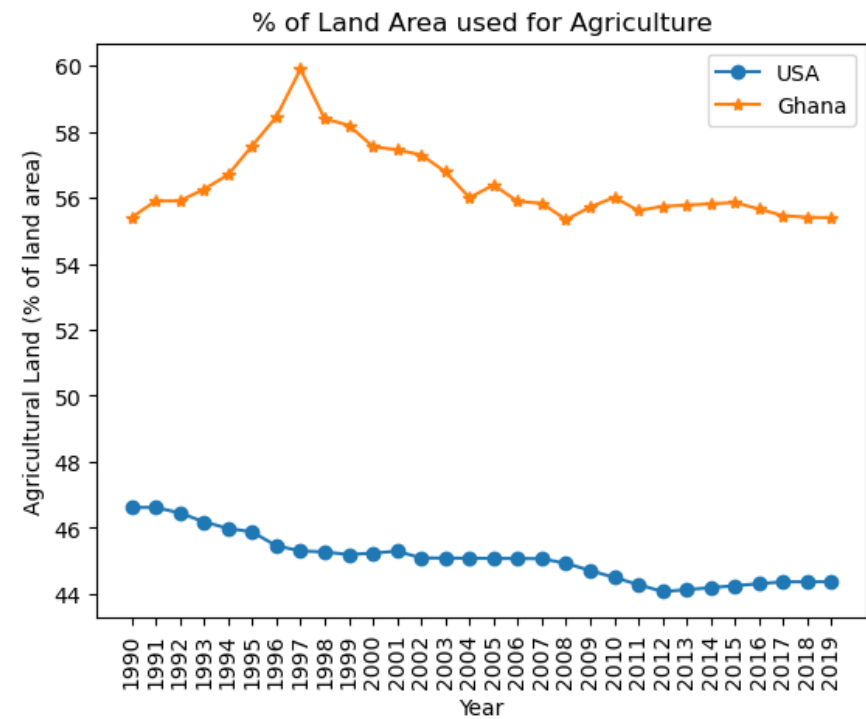
GHG Emissions from Agriculture

- What is the GHG emissions trend at a yearly rate when comparing the United States and Ghana?
- Between the US and Ghana, which country emits the higher level of GHGs?
- What year between Ghana and the US produced the highest GHG emissions?

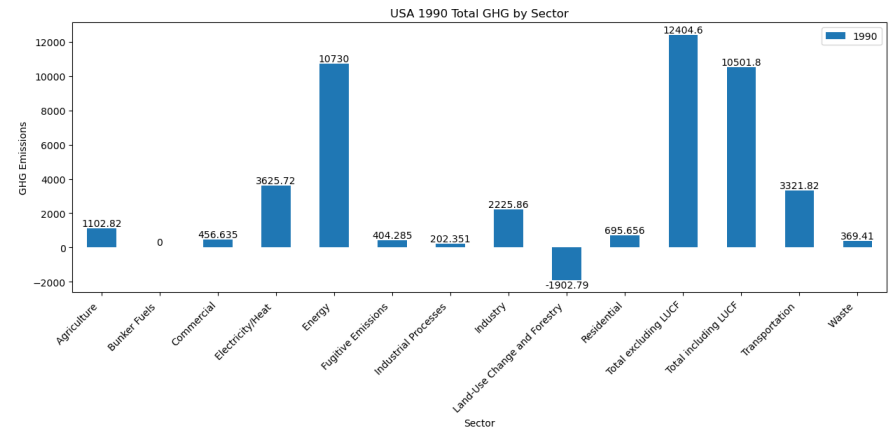
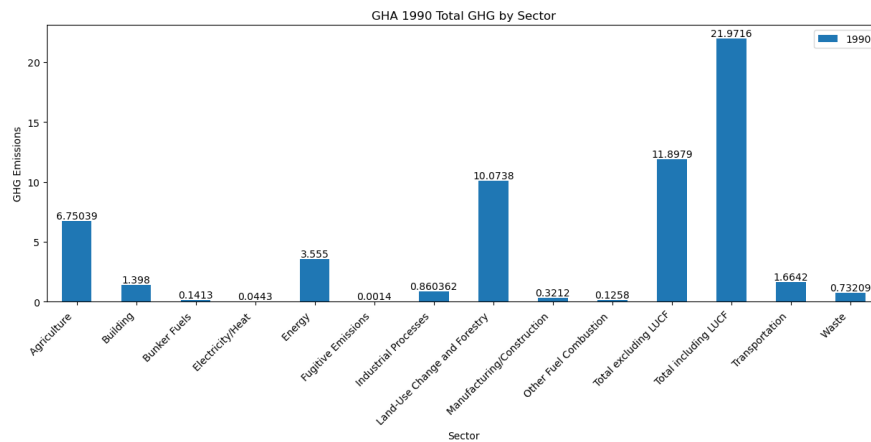


Land Area Used for Agriculture

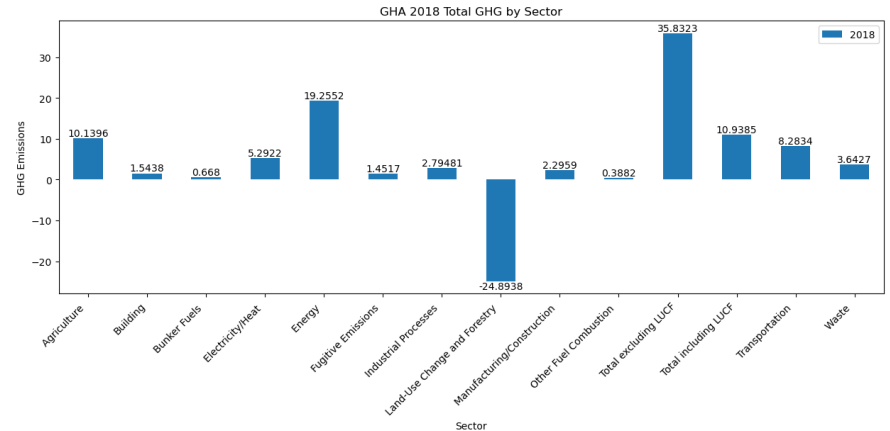
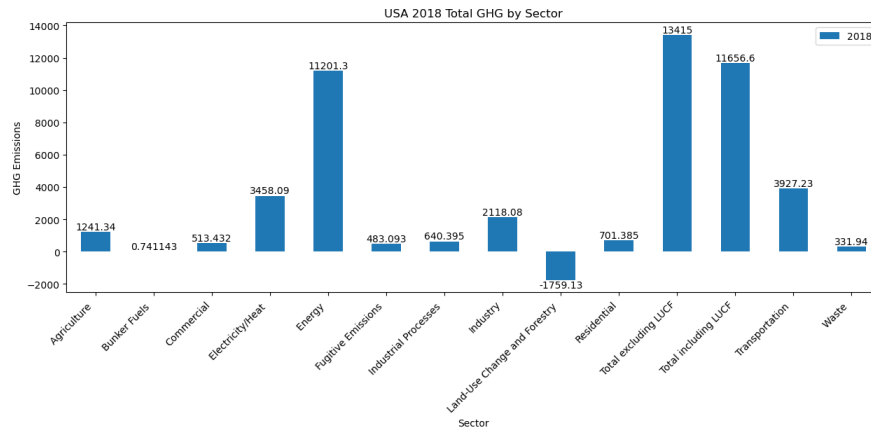
- How do the US and Ghana compare in land area usage for agriculture over the years?



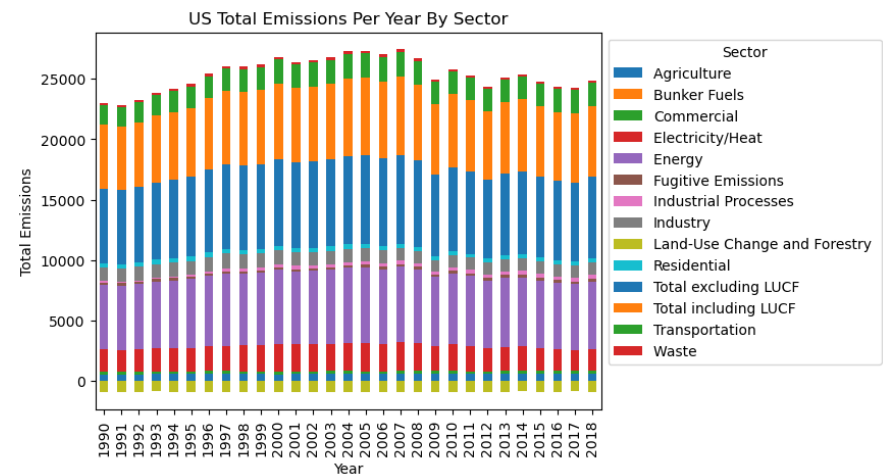
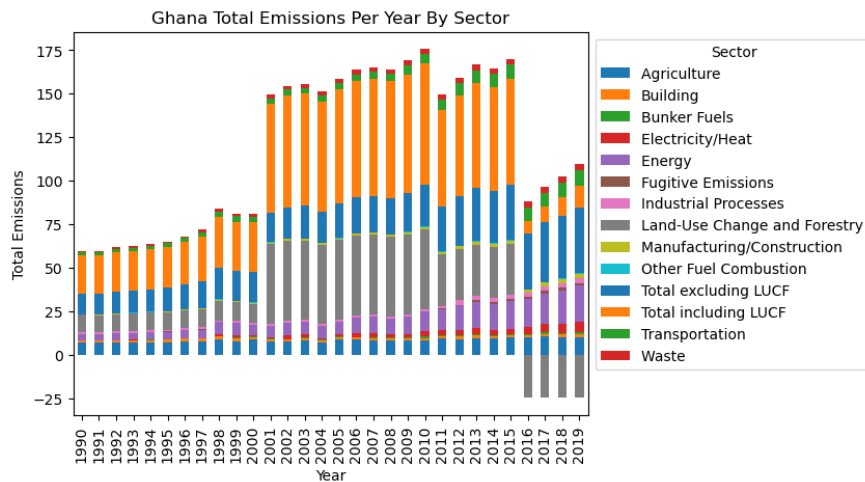
1990 Total GHG by Sector Comparison



2018 Total GHG by Sector Comparison

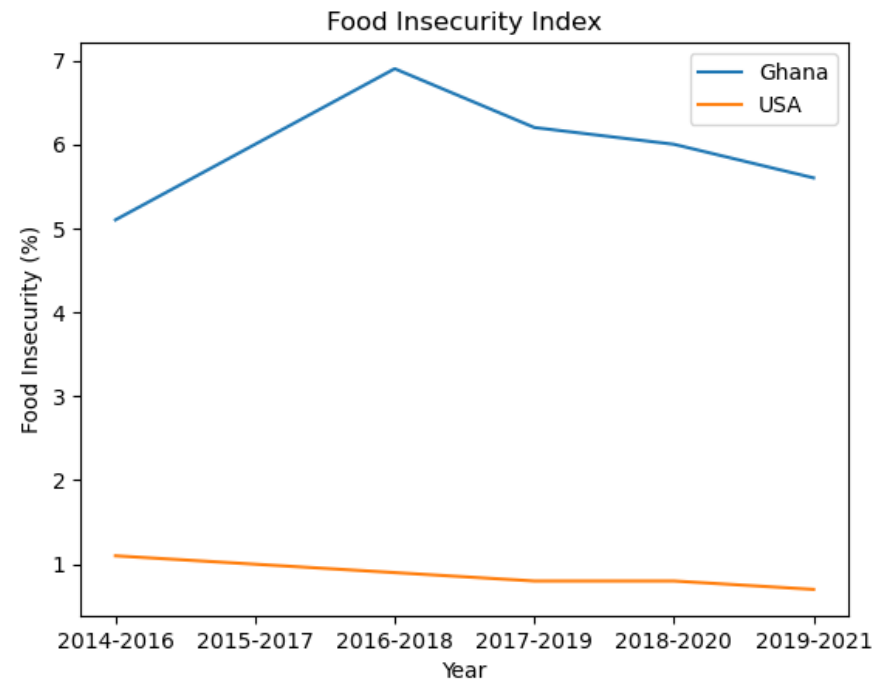


Total Emissions Per Year by Sector Comparison



Food Insecurity Index

- How does the Food Insecurity Index compare between Ghana and the US within the presented time frames?



Limitations and Implications

- Limitations

- Only two countries were compared when reviewing GHG and agriculture
- Not enough data to expose a causal relationship between GHG, food index, weather, and land usage.
- Overlap in years for the Food Insecurity Index, preventing a yearly time-frame perspective.
- Lack of insight of the differences in agriculture and land usage between the target countries.

- Implications

- Countries can evaluate the GHG emissions they are producing and continue to make adjustments to reduce the emission amount based on historical and recent data.
- Based on the sector and GHG emissions, work on development of policies and procedures to implement changes to reduce emissions.

Conclusion

- The relationship between greenhouse gas emissions and food security in Ghana is complex and multifactorial. Carbon emissions have indirect effects on food security, such as changing weather patterns, extreme weather events, and impacts on crop production. Quantifying the exact proportion of food security that can be attributed solely to greenhouse gas emissions is challenging.
- Changes in land use for agriculture, droughts, flood events all contribute to food security, however it's important to note food security in Ghana is influenced by multiple factors beyond carbon emissions like infrastructure, policies and socioeconomic factors. Addressing food insecurity requires an approach that takes both indirect and direct effects on carbon emissions.