

Figure 1: Amazon Rainforest

THE IMPACT OF AMAZON DEFORESTATION ON BRAZIL'S CARBON FOOTPRINT

How does the deforestation of the Amazon rainforest affect CO2 emissions in Brazil?



Introduction

- Forests act as carbon sinks, absorbing CO2
- The Amazon rainforest plays a crucial role in the global carbon cycle, absorbing significantly more CO₂ than other forest types.
- Brazil holds 60% of the Amazon rainforest, making it a key player in combating climate change.
- Deforestation threatens this role, driving CO₂ emissions
- \rightarrow Analyze the relationship between deforestation in the Amazon and Brazil's CO₂ emissions.



Datasources

Brazilian Amazon Rainforest Degradation

- contains the deforestation area by year and state of the Amazon rainforest in Brazil
- Unit: km²
- **Years**: from 2004 to 2019
- Source: Kaggle
- Data Type: CSV
- License: CC0 (Public Domain)

CO₂ and Greenhouse Gas Emissions

- dataset contains CO₂ emissions data worldwide and by country, including emissions from various sectors such as land use
- Unit: Mt (1 Mt = 1 million tonnes)
- **Years**: from 1751 to 2022
- Source: Our world in Data
- Data Type: CSV
- License: Creative Commons BY (CC BY)



Figure 2: ETL-architecture

DATA PIPELINE

- Python
- ETL-architecture

Output of the Pipeline

Ano/Estados	AC	AM	AP	MA	MT	PA	RO	RR	то	AMZ LEGAL
2004	728	1232	46	755	11814	8870	3858	311	158	27772
2005	592	775	33	922	7145	5899	3244	133	271	19014
2006	398	788	30	674	4333	5659	2049	231	124	14286
2007	184	610	39	631	2678	5526	1611	309	63	11651

Table 1: Top five rows of deforestation_data.sqlite

country	year	co2	co2_including_luc	cumulative_co2_includi ng_luc	cumulative_luc_co2	land_use_change_co2
Brazil	2004	361.434	2560.971	105928.805	97239.344	2199.537
Brazil	2005	364.371	2279.558	108208.359	99154.523	1915.187
Brazil	2006	368.871	2091.557	110299.922	100877.211	1722.686
Brazil	2007	390.573	1906.509	112206.43	102393.148	1515.936

Table 2: Top five rows of co2_data.sqlite

Correlation between deforestation and CO2 emissions Data points Regression line 2200 CO2 emissions from land use change (Mt) 2000 1800 1600 1400 1200 1000 5000 10000 15000 20000 25000 Total deforestation (km2)

Figure 3: Correlation between deforestation and CO2 emissions

Analysis

- pearson correlation coefficient: 0.92
- **P-Value:** 0.000

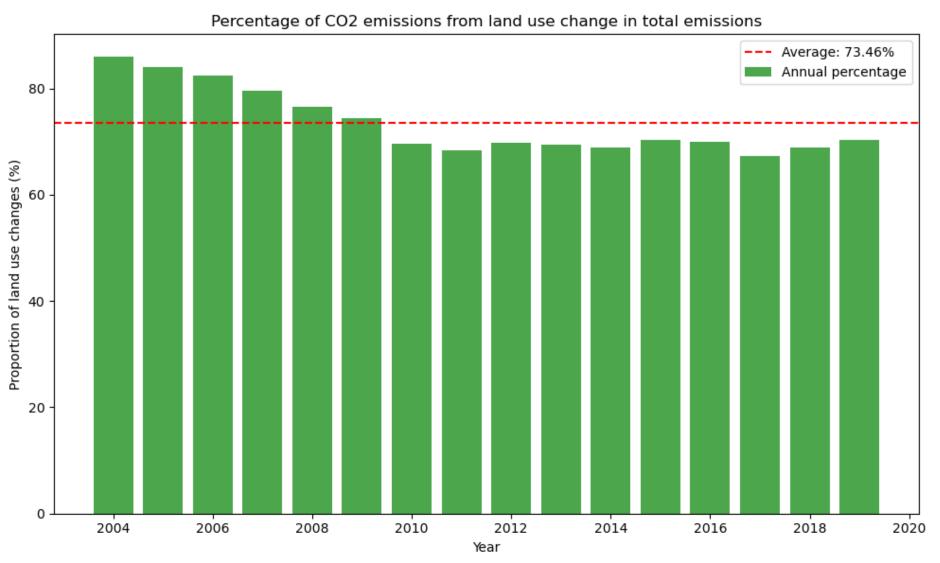
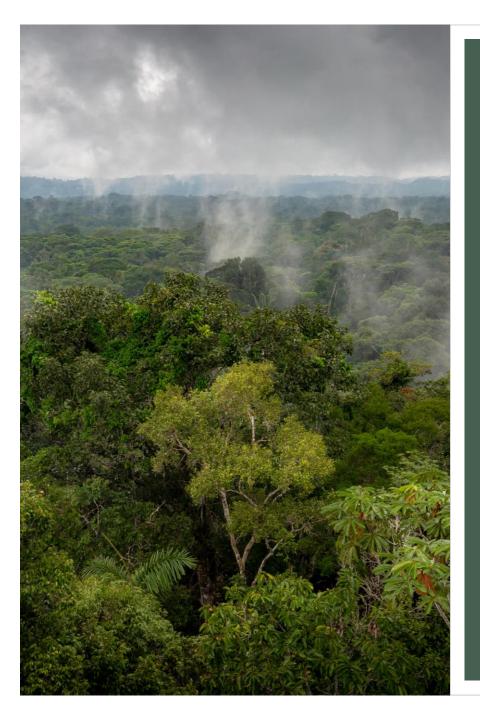


Figure 4: Percentage of CO2 emissions from land use change in total emissions

Analysis

- Average contribution: 73.46%
- Range: 67.27% to 85.89%.



Limitations

- Correlation does not imply causation
- external factors (e.g., climate, economy, policies) may also influence emissions.
- The analysis is based on a simple linear model without considering other factors like fires or agricultural activities.
- Data covers only 2004–2019 and excludes developments post-2019.
- CO₂ data relies on estimates and includes emissions from landuse change, not deforestation alone, affecting accuracy.
- Future Research:
 - Employ multivariate or non-linear models for deeper insights.
 - Investigate regional deforestation differences and their specific CO₂ impacts.

