How has Agriculture and Livestock Production Contributed to Deforestation in Brazil?

(1) Introduction & Theme

The theme would be on sustainability and the environment. The story will study the trends in agriculture and livestock production in Brazil and how such produce can contribute to deforestation in Brazil.

The data story will first mention Brazil's role as a superpower in agriculture and livestock production. Brazil is one of the largest food producers in the world, with the fourth-largest Gross Domestic Product (GDP) value for agricultural produce and one of the largest populations of livestock in the world (Schneider et al., 2023). The produce can be exported to feed people from other countries, showing the significance of Brazil's contribution to the food supply worldwide.

The story would then raise the issue of how Brazil's agriculture and livestock production is also the leading cause of deforestation in Brazil. Farmers may seek to clear rainforests to start plantations and create pastures (Moran, 2018). Excessive clearing of rainforests drives climate change, indirectly affecting people worldwide. The title of agriculture superpower that Brazil holds is hence not without consequences.

Through visuals and descriptions, the data story will investigate the trends, the different types, and the amount of agriculture and livestock produced in Brazil. This allows better context as to what contributes to deforestation in Brazil, allowing for more targeted efforts to reduce deforestation in Brazil.

(2) Purpose & Importance

Brazil is one of the largest emitters of greenhouse gasses due to "deforestation, agriculture and other land-use" (Gratten, 2022). These greenhouse gases contribute to climate change that affects countries worldwide. Understanding how agriculture and livestock production contributed to deforestation in Brazil is crucial as it can help provide solutions that reduce deforestation and protect biodiversity.

Addressing the question can show how specific crops or livestock may emit more greenhouse gases, allowing for more targeted solutions. For instance, rearing livestock usually causes greenhouse gas emissions as it requires cleared land for pastures and crops grown for feed. Meat products, therefore, indirectly fuel the production and hence emissions of certain crops. Changing consumption habits, like

cutting out meat, is an example of an approach to indirectly reduce deforestation and hence emissions. Addressing the question can therefore drive future solutions to mitigate deforestation.

Additionally, addressing the question can help preserve biodiversity. Understanding the agriculture and livestock produce that contributes to deforestation allows better measures to prevent such clearing of rainforests. The Amazon rainforest is the world's largest tropical carbon sink (Pannett, 2021). It holds over 3 million species in an interconnected and balanced ecosystem (Thomson, 2020). Land cleared for pastures and plantations threatens the balance, causing a decline in biodiversity. This potentially leads to the loss of the healthcare and food security benefits that biodiversity provides. Addressing the question helps reduce deforestation, therefore preserving biodiversity.

(3) Data Sources

The historical emissions dataset provides information on the causes of greenhouse gas emissions in Brazil (Climate World Data, n.d.). Deforestation, from agriculture or livestock production, is often the cause of the emissions. This dataset allows a better understanding of the contributors of greenhouse gas emissions and deforestation in Brazil.

Other datasets include commonly produced crops in Brazil, including maize, soybean, and sugarcane (Ritchie et al., 2023). The variables in each datasheet include the amount produced, the land used, and the amount used for animal feed. Each dataset shows variables from 2011-2020. This hopes to study the trend of that particular crop's production and its trajectory. From the dataset, I can learn more about the crops that drive agriculture production in Brazil and the purpose of the produce, such as for animal feed. This can better contextualise the agriculture production in Brazil, potentially allowing for the adoption of practices that can reduce deforestation from crop production. Hence, the datasets on the different crops can help answer how agriculture production contributed to deforestation.

Lastly, studying datasets on meat production like cattle, pigmeat and poultry, coupled with the crop production datasets, can provide insights into deforestation in Brazil (Ritchie et al., 2023). For instance, the trends of livestock production, in addition to the portion of crops allocated for animal feed, can explain how the resources are being allocated for livestock production. This can therefore contextualize deforestation as a result of livestock production.

(4) Insights from the Visualisation Plots

An insight from the data would be the extent of greenhouse gas emissions contributed by agriculture and land use in Brazil. The bar graph generated from the historical emissions dataset clearly shows that more than half of the total emissions in Brazil came from agriculture land use and forestry from 2011 to 2020. Since deforestation is often the cause of emissions, agriculture or livestock production activities are therefore the main drivers of deforestation.

From the data, soybean appears to be one of the largest contributors to deforestation. Despite the production of sugarcane being significantly higher, the amount of land used for soybean production is the most significant and is still increasing as of 2020. This shows that much of the land area cleared is being used for soybean production. Soybean production is hence the most significant crop contributor to deforestation.

The data shows that the maize produced largely served as animal feed. About half of the maize produced is used as animal feed. This is significantly more than the portion of soybean or sugarcane produced used for animal feed. Maize is one of the most popular animal feeds for poultry (Jacob, n.d.). From the data, poultry production, in mass and quantity, is the highest among the meat types from the period of 2011 to 2020. Cattle production, in terms of mass, comes in second, followed by pigmeat. The data hence supports the idea of maize production for animal feed.

(5) Project Implementation & New Concepts

Before starting the project, I researched different potential topics and datasets. I also experimented with visualisation features in the Shiny App. Coming up with a placeholder helped me organise and visualise my thoughts before starting on the application. This planning would later guide me on the rest of the project.

I initially started with a write-up on deforestation and agriculture and livestock production in Brazil. This information would later be rephrased to be included in the website to provide context on the data that would later be analysed. I learnt to include videos, images, and website links into the page itself, using codes like “<img src=“ ”>” and other codes for style. In addition to experimentation, the website also involved a lot of research. This research would serve as a foundation for the data analysis in the next segment of the project.

When constructing the application, I referenced the placeholder for the data used and the way it is presented. I decided to mainly use graphs as it allows for the visualisation of trends. I settled on using “plot_ly()” instead of “ggplot()” as I preferred the aesthetics and workings of the former. To compare the different datasets, I used codes like “selectizeInput()” for the UI aspect. Codes like “tabsetPanel()” also allowed for exploring different topics by alternating between the tabs created. With the visualisations, I was able to analyse the information from the datasets better and make more conclusions about the topic.

Word Count: 1198

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