APPLIED DATA SCIENCE ASSIGNMENT 2

Interconnected Indicators: A Climate Change Analysis using World Bank Data

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Abstract

The report analyzes ten indicators across fifteen countries, focusing on factors related to population, urbanization, agriculture, energy, and the environment. The findings suggest that countries with high levels of urbanization tend to have higher access to electricity, but also higher CO2 emissions per capita. Renewable energy consumption is positively correlated with forest area percentage, indicating the potential for renewable energy to support sustainable land use practices. Countries with higher percentages of agriculture value added tend to have higher child mortality rates, suggesting a need for greater investment in nutrition and healthcare for young children. Finally, the report highlights the importance of protecting natural areas, as countries with higher percentages of terrestrial and marine protected areas tend to have lower urbanization rates. Overall, the report provides valuable insights into the relationship between various indicators and the potential impact of policy decisions on the environment and quality of life in these countries.

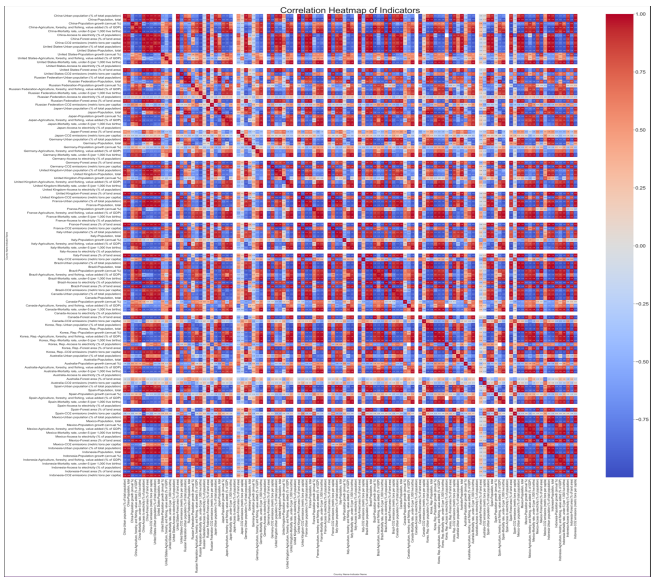
GitHub Repo Link:
https://github.com/ameerhamza95/ADS_1_Assignment-2.git

https://data.worldbank.org/topic/climate-change

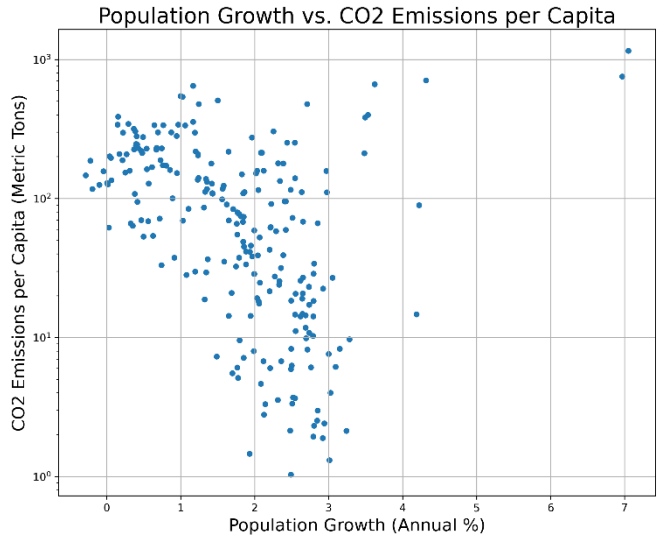
An analysis of climate change data using the World Bank dataset

An analysis was conducted on 15 countries from different continents to explore the interrelations of population, urbanization, agriculture, renewable energy consumption, and environmental impact on climate change.

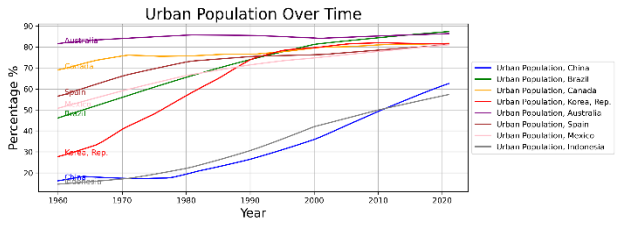
The study identified correlations between the factors and investigated the underlying causes.

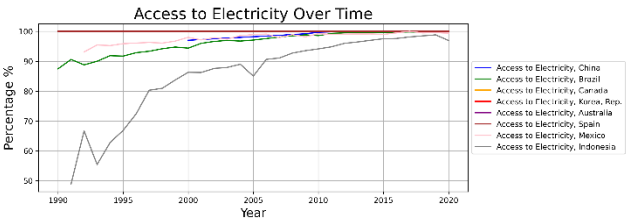


In this analysis, a heatmap was created to examine the correlations between selected indicators and countries. Six potential correlations among the indicators were identified and graphically represented. A high-resolution image of the heatmap is attached with the report for detailed examination.



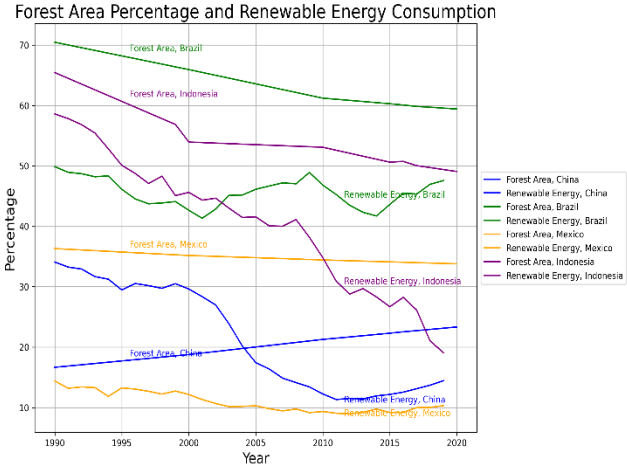
The scatter plot analyzed the relationship between population growth and CO2 emissions for the whole world. The results showed that countries with a population growth rate of 1-3% had CO2 emissions of up to 1000 MT/capita, which is mainly due to urbanization. The graph on the right shows that most of the population growth occurred in developed areas.





As urbanization increases, access to electricity also increases as depicted by the above graph. China and Korea Rep. have the highest urban population increase. All countries except Indonesia have a high percentage of their population with access to electricity.

The relationship between urbanization and access to electricity can also be linked to the importance of renewable energy sources in promoting sustainable urbanization. The increase in urban population and demand for electricity may lead to an increase in carbon emissions, which can contribute to climate change. By promoting renewable energy consumption, countries can mitigate the environmental impact of urbanization while ensuring access to electricity for their citizens. Additionally, preserving forest areas can help reduce the negative impact of urbanization on the environment and promote sustainable land use.



The graph shows a decline in both renewable energy consumption and forest area among most countries

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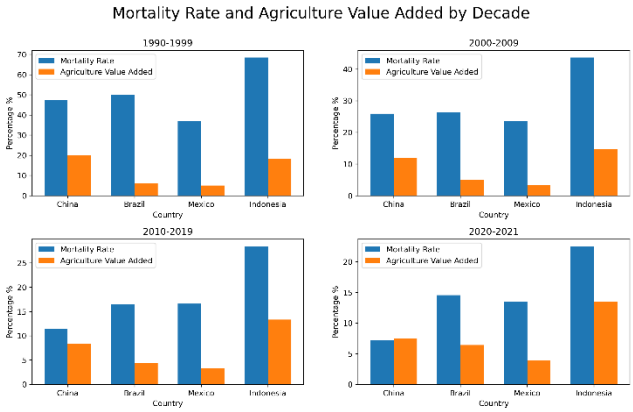
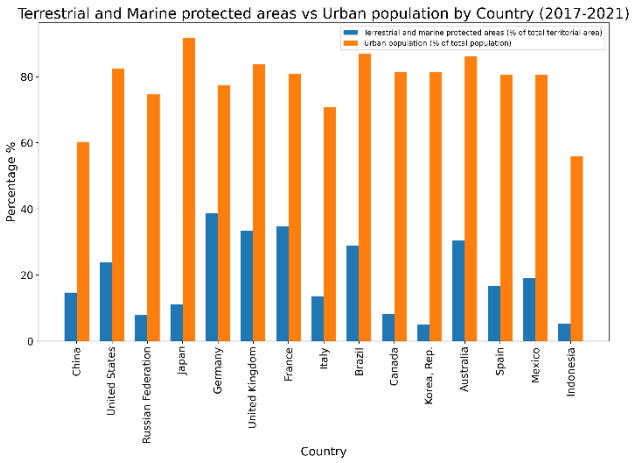
highlights the negative impact on the environment. However, China's steady increase in forest area is a positive sign towards sustainable land use. Brazil's decline in forest area could be linked to their agriculture, forestry, and fishing value added, which might have been prioritized over conservation efforts. There could be a link between forest area, agriculture, and mortality rate, under 5 (per 1000 births), as deforestation can lead to a loss of biodiversity and affect food and nutrition sources, which can impact child mortality rates.

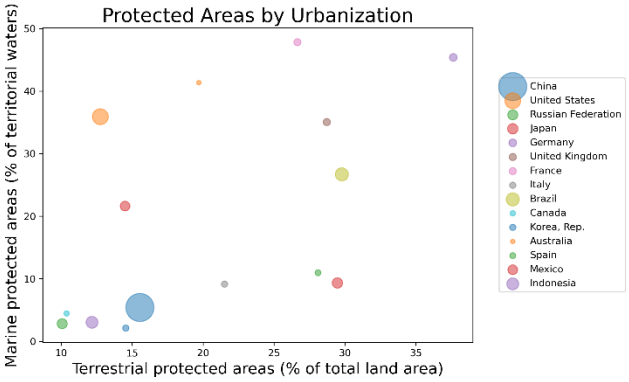


The bar graph shows that for Brazil, Mexico, and Indonesia, the mortality rate under 5 remained stable while agriculture value increased slightly over the past 4 decades while China experienced a decline in mortality rate. The trends suggest a possible link between mortality rate, agriculture, and other factors such as urbanization and protection of terrestrial and marine areas. Urbanization and agricultural activities can impact the protection of these areas and lead to poor health outcomes for children under 5.



The chart highlights that some countries, mainly in Europe, have made significant progress in protecting their terrestrial and marine areas, with high percentages of their territory being protected. However, there is a need for improvement in other regions, as seen by the low percentages in some countries like Korea. This low protection could be attributed to high urbanization rates, as cities tend to expand at the expense of natural habitats, and protected areas may not be a priority. Therefore, it is crucial to strike a balance between urban development and the protection of natural resources.

Urbanization can negatively impact natural habitats and biodiversity, highlighting the importance of protected areas. It is crucial to prioritize the protection of terrestrial and marine areas, particularly in regions with high urbanization rates, to ensure a sustainable future. This relation can be understood by the bubble plot of terrestrial and marine areas as a function of urbanization.



Protecting natural resources and promoting renewable energy consumption can reduce CO2 emissions, especially in regions with high urbanization rates. This link is evident in the selected countries table, where high renewable energy consumption is associated with lower CO2 emissions.

Country	Indicators	1990-1999	2000-2009	2010-2019
Australia	CO2 Emissions per Capita	16.21	18.19	16.25
	Renewable Energy Consumption	8.39	7.38	9.15
Brazil	CO2 Emissions per Capita	1.49	1.80	2.22
	Renewable Energy Consumption	46.64	45.31	44.85
Canada	CO2 Emissions per Capita	15.39	16.69	15.69
	Renewable Energy Consumption	21.77	21.83	22.21
China	CO2 Emissions per Capita	2.33	4.17	7.15
	Renewable Energy Consumption	31.36	20.53	12.46
France	CO2 Emissions per Capita	6.12	5.87	4.85
	Renewable Energy Consumption	10.51	9.39	13.41
Germany	CO2 Emissions per Capita	10.95	9.83	9.04
	Renewable Energy Consumption	2.42	7.11	14.27
Indonesia	CO2 Emissions per Capita	1.08	1.50	1.94
	Renewable Energy Consumption	52.08	42.00	27.38
Italy	CO2 Emissions per Capita	7.22	7.77	5.82
	Renewable Energy Consumption	4.71	7.46	15.60
Japan	CO2 Emissions per Capita	9.10	9.30	9.27
	Renewable Energy Consumption	4.12	4.11	5.92
Korea	CO2 Emissions per Capita	7.77	10.08	11.92
	Renewable Energy Consumption	0.80	0.88	2.37
Mexico	CO2 Emissions per Capita	3.55	4.02	3.94
	Renewable Energy Consumption	13.02	10.31	9.52
Russia	CO2 Emissions per Capita	11.90	11.13	11.38
	Renewable Energy Consumption	3.81	3.51	3.29
Spain	CO2 Emissions per Capita	5.98	7.42	5.50
	Renewable Energy Consumption	9.11	8.80	16.34
UK	CO2 Emissions per Capita	9.34	8.77	6.38
	Renewable Energy Consumption	0.89	1.58	7.64
USA	CO2 Emissions per Capita	19.54	19.17	15.74
	Renewable Energy Consumption	4.61	5.85	9.18

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