Analysis Report: **Climate Disaster Trends and Risk Correlation Analysis**

Introduction:

Change in climate is an issue which always exists and needs to be attended. It impacts every aspect of environment and societies. The main and important concern is the frequency of climate disasters also its severeness. We can get insights into how to get prepared in such situations by understanding the relationship between climate-related disasters and risk indices, such as the INFORM Risk Index, which can help in predict actual occurrences. This report aims to answer the following questions

How has the frequency of climate-related disasters evolved globally over the years?

Which nations or regions experience particular kinds of climate-related disasters most frequently?

Do more severe climate disasters occur in nations with higher INFORM risk indicators?

Through performing data analysis on climate disasters data set and INFORM risk data set, we look forward to finding patterns and relationships that can help us to prepare and mitigate disasters.

Used Data:

Data source 1: Climate Disasters Frequency

Data URL: https://opendata.arcgis.com/datasets/b13b69ee0dde43a99c811f592af4e821_0.csv

This data source contains the data of frequency of disasters occurred from year 1980 to 2022. It contains data of several disaster categories occurred, including storms, floods, wildfires, droughts. It is sourced from EM-DAT by the Université catholique de Louvain. Each record in this dataset indicates the number of occurrences of a specific disaster type in a particular country for a given year.

Data source # 2: Climate-driven INFORM Risk

Data URL: https://opendata.arcgis.com/datasets/7cae02f84ed547fbbd6210d90da19879_0.csv

This data source contains the data of risk associated with climate driven hazards divided in three types: hazard & exposure, vulnerability, and lack of coping capacity. The available data is from 2013 to 2021. This dataset aids in assessing the vulnerability of different countries. The INFORM Risk Index ranges from 0 to 10, with higher values indicating higher risk levels

Both data sources are open licensed, for more details you can refer to IMF's general terms and condition of use.

Analysis

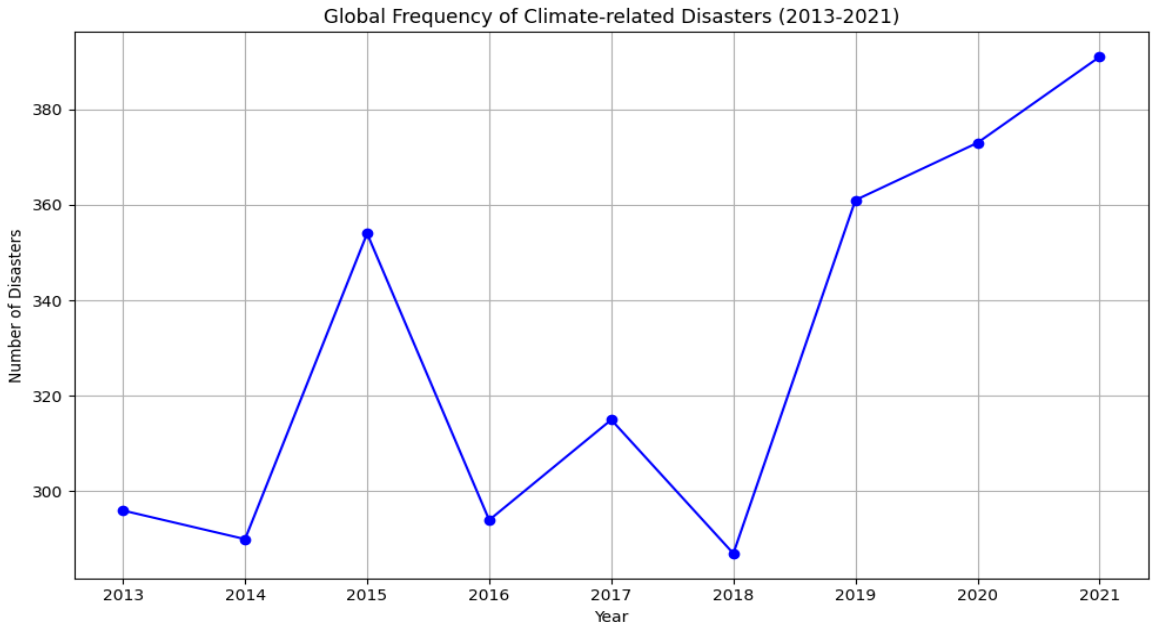
Method:

Systematic approach has been used to answer those three questions. data extraction, transformation, and visualization were performed. First, we collected global data on the frequency of climate-related disasters from 2013 to 2021 to identify trends. A line plot was visualised to illustrate how the frequency of these disasters has evolved over the years. After that, we identified countries with the highest occurrences of specific types of disasters. We visualized the top five countries most affected by each

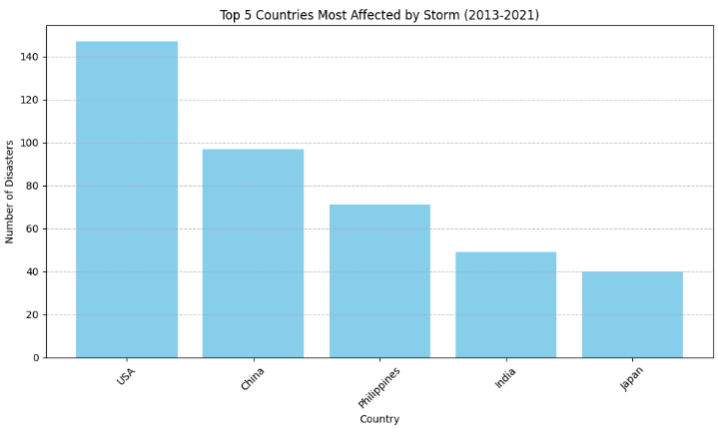
disaster type using bar charts. Lastly, we inspected the relationship between the disasters and inform risk dataset. We analysed countries data available in both datasets to calculate the correlation between disaster frequency and inform risk. Scatter plots and heatmaps were used to visualize the relationships, showing that some countries have a strong positive correlation, showing that higher risk indices correspond to more frequent disasters.

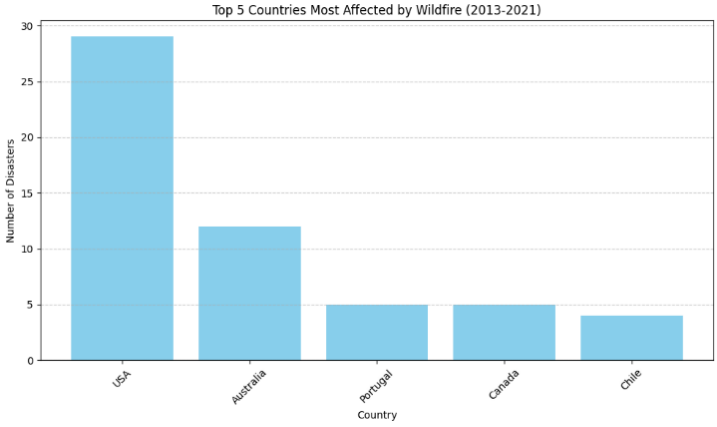
Result:

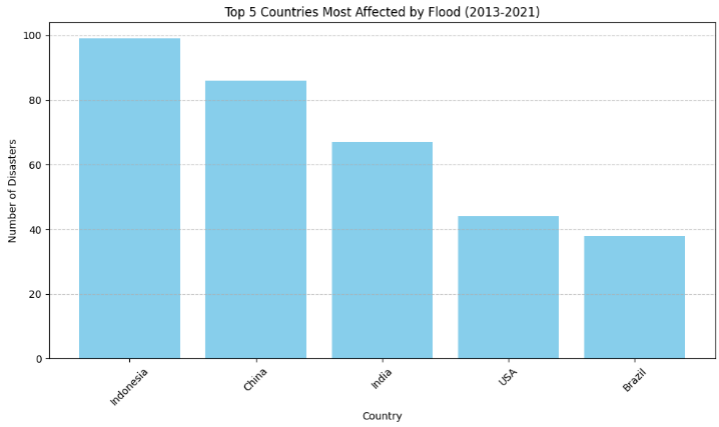
Global Frequency of Climate Related Disasters: The frequency of climate related disasters has generally increased from 2013 to 2021, with a notable peak in 2021. A line plot showing the annual global frequency of climate-related disasters.

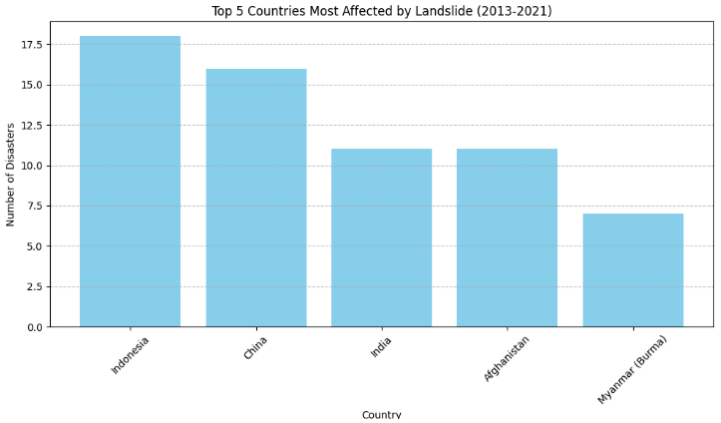


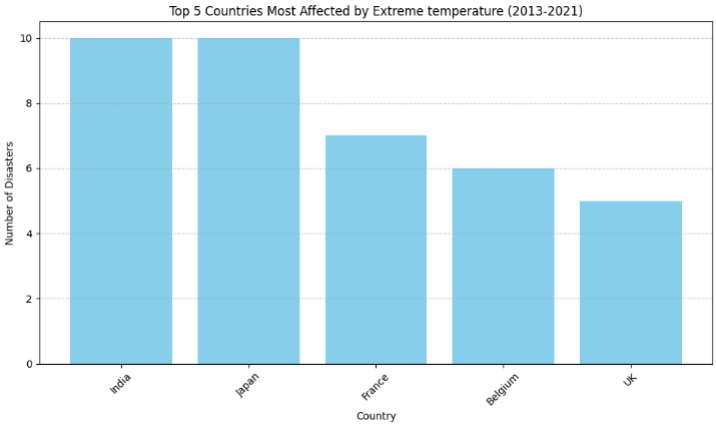
Country Specific Disaster Frequency: Some countries frequently experience specific types of disasters. For example, United States of America and China are highly affected by Storms, on the hand Indonesia and the China face major flood occurrences.

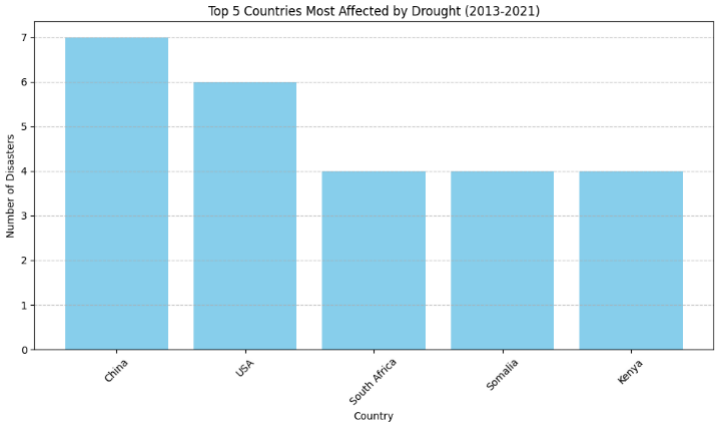






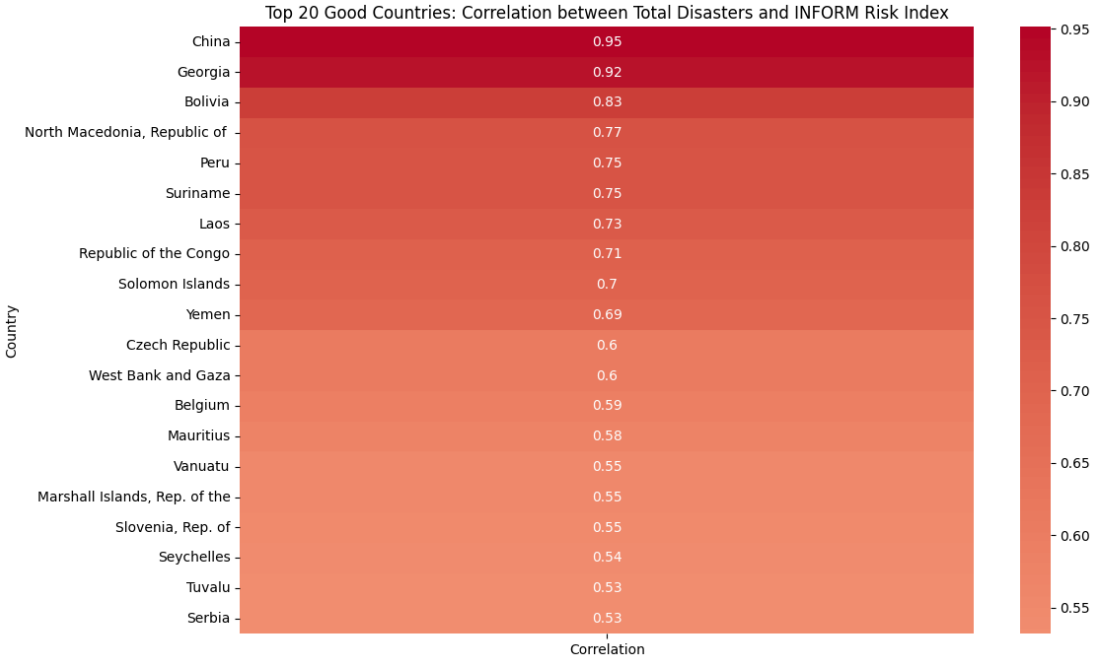




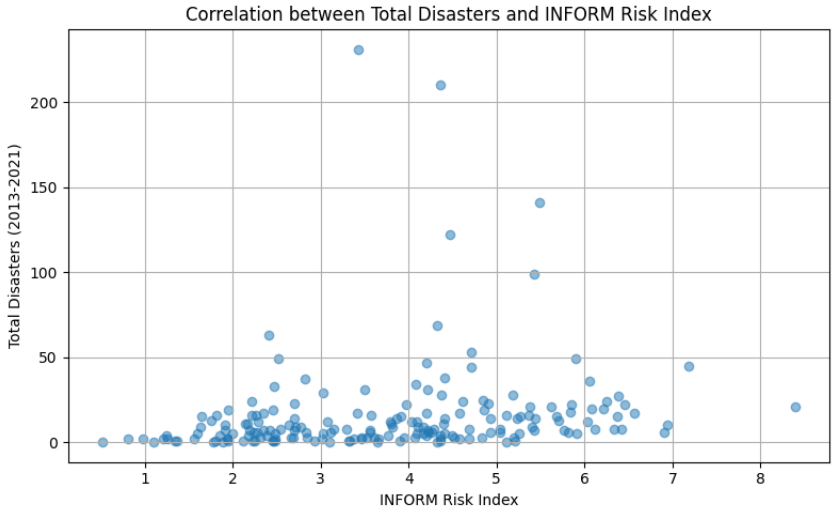


Top 5 countries are shown after the analysis which were most frequently affected by various types of climate disasters from 2013 to 2021. The results are visualised in bar charts, each focusing on a specific type of disaster.

Correlation with Inform Risk Indicators: After performing the correlation analysis, it was found that certain countries exhibit a strong positive correlation between the total number of disasters and the INFORM Risk Index. Below heatmap show top 20 countries with the highest correlation between total disasters and inform risk Index.



The heatmap shows that some countries, such as China, demonstrate a strong correlation, suggesting that higher inform risk index values correspond to a higher number of disasters. Moreover, the scatter plot which is shown below illustrates the correlation between total disasters and the inform risk index. This plot shows us that, while some countries express a notable correlation, but the overall trend is not strongly linear for all countries.



These findings highlight global trends, regional vulnerabilities, and the effectiveness of the INFORM Risk Index in predicting disaster occurrences in specific countries.

Conclusion

[1] The frequency of climate-related disasters has increased globally from 2013 to 2021, peaking in 2021. This highlights the growing impact of climate change and the need for enhanced global disaster preparedness. [2] Certain countries are more affected by specific disasters. The USA and China experience many storms, while Indonesia, China, and India frequently face floods. This suggests the need for targeted disaster management strategies. [3] The correlation between disaster frequency and the INFORM Risk Index varies. Some countries, like China, show a strong positive correlation, but this is not consistent globally. The INFORM Risk Index alone may not predict disaster occurrences accurately.

Critical Reflection: The questions were partially answered. Global disaster frequency trends and regional vulnerabilities were identified, but the relationship between disaster frequency and the INFORM Risk Index is complex and not uniformly linear.

Limitation: The analysis period of 2013-2021 might be too short to capture long-term trends in climate-related disasters. Additionally, the INFORM Risk Index might not fully account for all local factors influencing disaster frequency, such as government policies, socio-economic conditions, and disaster management capabilities. Furthermore, the correlation between disaster frequency and the INFORM Risk Index varies significantly across different countries and years, indicating the need for more granular and localized studies to better understand these relationships