



# 2024 GEOGRAPHICAL VULNERABILITY INDEX

20763 – Geopolitics for Business

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# Table of Contents

- 3** Introduction
- 4** Initial Data
- 5** Sub-indexes analysis
- 15** Final Data
- 16** Recommendations
- 17** Conclusion



# Introduction

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**How vulnerable is a country from a geographical perspective?**

Geographic vulnerability refers to the susceptibility of a specific area to adverse impacts due to its environmental characteristics (Timmerman, 1981)

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## OUR TASK

We were assigned the task to expand in space and time the **2023 Geographical Vulnerability Index**



# Initial Data

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- **6** sub-indexes for **179 countries**
- Cross-country final score
- Methodological limitations



# Sub-indexes

**01** Emissions

**02** Climate Change

**03** Sustainment for  
Human Activity

**04** Natural Disaster

**05** Natural Resources

**06** Sea Access



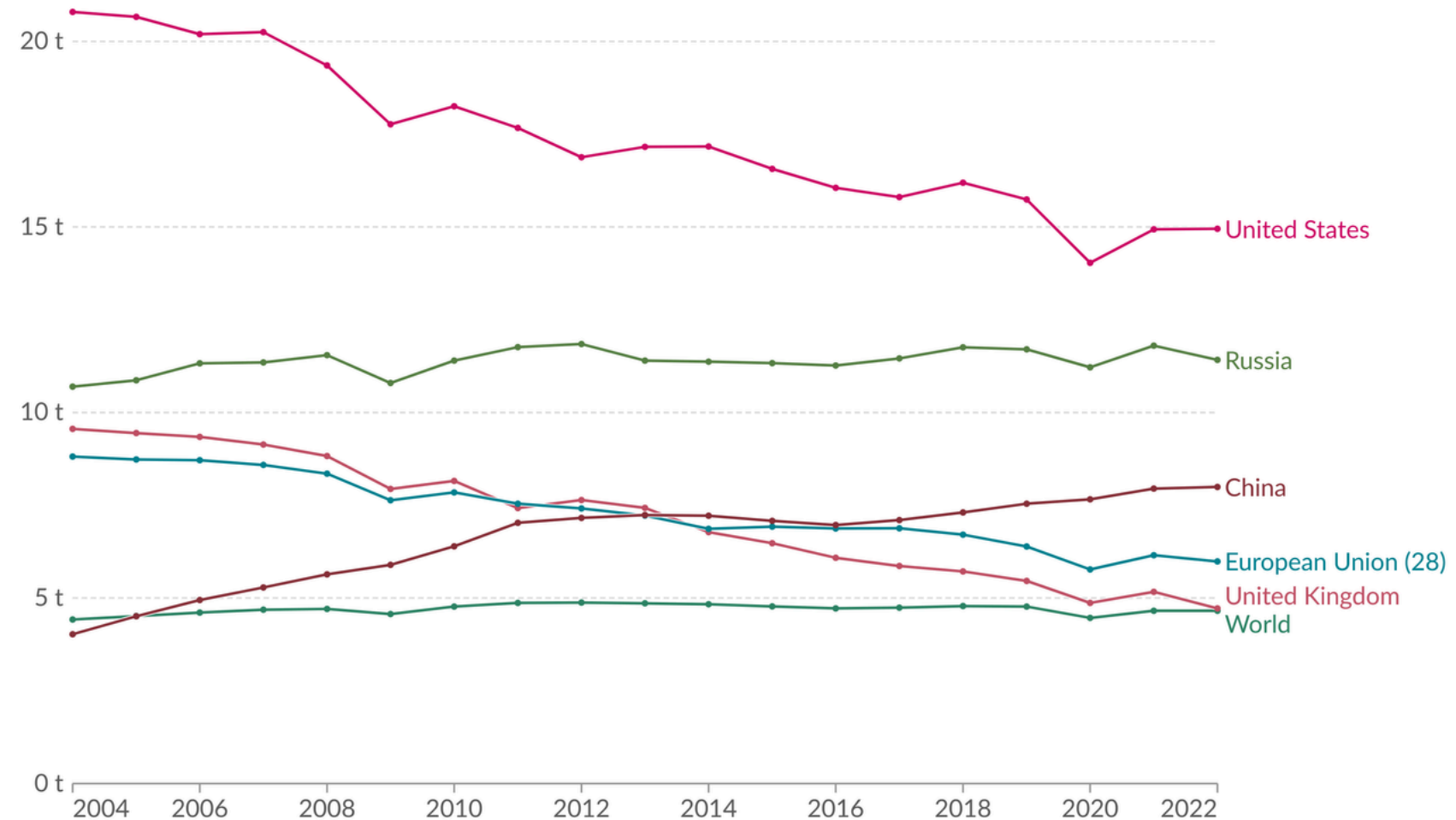
# Emissions

■ Fossil emissions measure the quantity of carbon dioxide (CO<sub>2</sub>) emitted from the burning of fossil fuels in industrial processes

■ Fossil CO<sub>2</sub> includes emissions from coal, oil, gas, flaring, cement and steel processes while excludes emissions embedded in traded goods

## Per capita CO<sub>2</sub> emissions

Carbon dioxide (CO<sub>2</sub>) emissions from fossil fuels and industry<sup>1</sup>. Land-use change is not included.



Data source: Global Carbon Budget (2023); Population based on various sources (2023)  
OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO<sub>2</sub>) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO<sub>2</sub> includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.



# Emissions

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## 2023

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- **208** initial countries
- Limited time span  
**2017 - 2021**

## 2024

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- **231** final countries  
(+23)
- Expanded time series  
**2004 - 2022**



# Climate Change

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## 2023

The 2023 Climate Change Sub-Index measures the average surface temperature change per year for **220 countries** in the time span **2017 - 2021**

## 2024

For the 2024 Climate Change Sub-Index, we track the annual surface temperature change for **223 countries (+3)** in the enlarged time span **2011 - 2023**

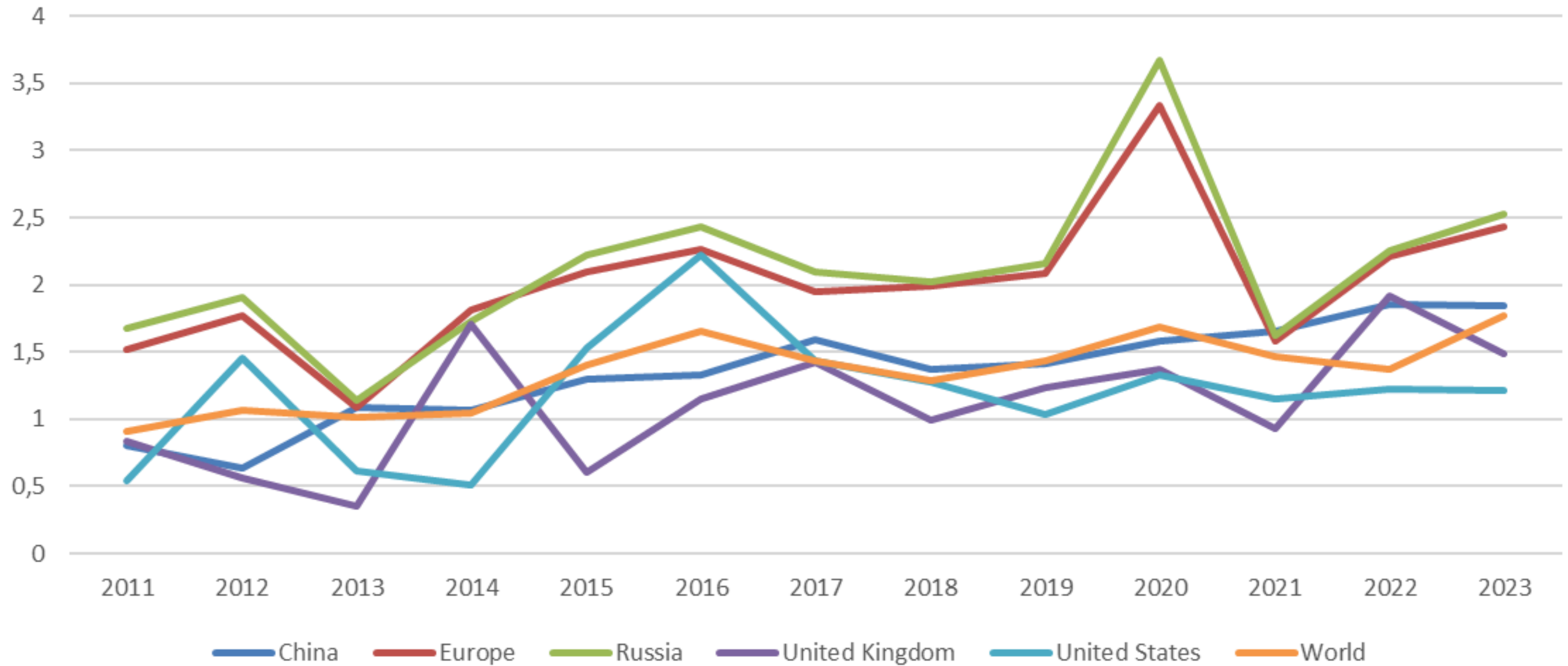




# Climate Change



Annual Surface Temperature Change (in Degree Celsius)





# Sustainment for Human Activity

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- Total agricultural land area as a proxy for the country's capability to sustain human activity
- In 2023 final Index of human activity sustainment, density of population has not been taken into account

**2024 FINAL SCORE** - Index weighted to the population density  
- From cross-country index to time-series: **1950 - 2023**  
- **197 countries** in sample



# Natural Disaster

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## 2023 SUB-INDEX

- Sub index based on the arithmetic average between the disasters ratio and human development index (HDI)
- Cross-country dataset with **227 countries**
- Lack of fundamental basis for econometric choices in the proxy identification

## 2024 SUB-INDEX

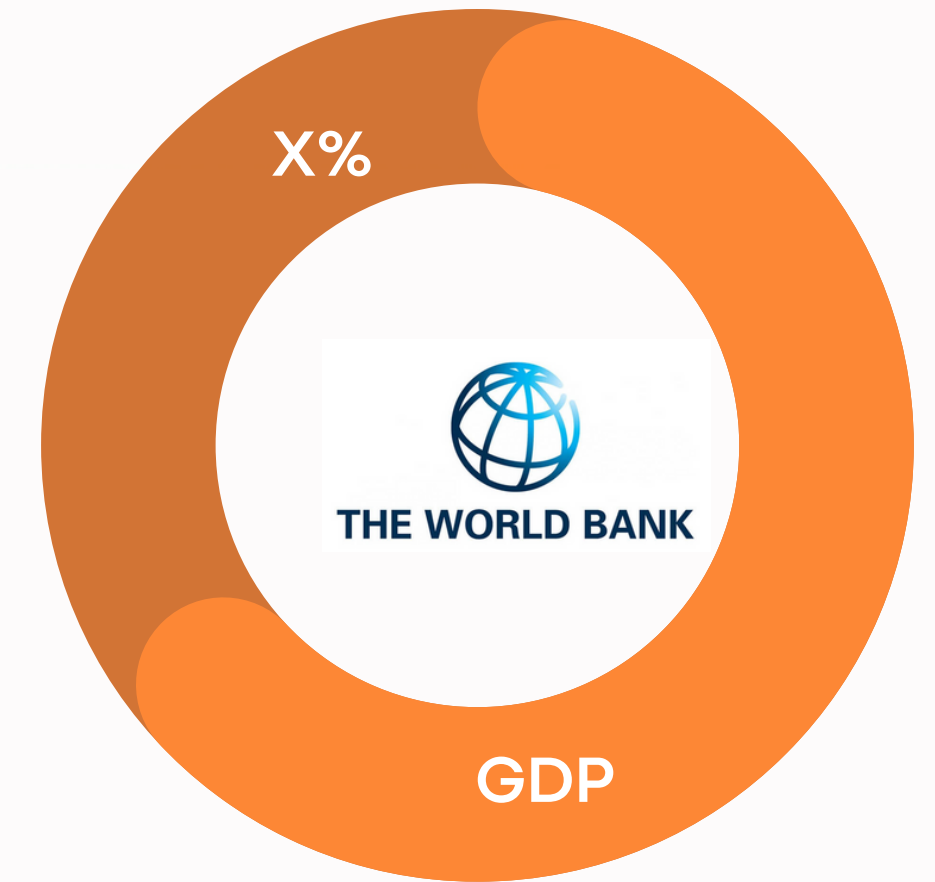
- Sub index based on the exposure to natural disaster variable of the WorldRiskReport
- Expanded time frame from **2011 to 2023** for up to **193 countries**
- Sub index perfectly matches with the initial purpose



# Natural Resources

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- **267** additional countries and geographical macro-areas (+ 87)
- Expanded time frame from 2014-2020 to **2011-2023**



The World Bank Group annually computes total natural resources rents by country and geographical area as a percentage of yearly GDP

## 2024 FINAL SCORE

The final score represents the availability of natural resources endowment by country in the period **2011 - 2021**. It ranks from 0 (high endowment) to 10 (low endowment).



# Sea Access

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## 2023 SUB-INDEX

- Sub-index based on countries' geographical position
- Number of neighboring countries not taken into account

## 2024 SUB-INDEX

- Sub-index based on countries' geographical position and **number of neighboring countries**
- The higher the number of neighboring countries, the higher the risk



# Final Data

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- 6 sub-indexes for more than **200 countries**
- Time-series final score for **168 countries** for the years **2011-2023**
- New accurate proxy variables



# Recommendations

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- Results' **robustness checks**
- **2 proxy variables** per sub-index
- Thorough **data documentation**



# Conclusion

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*“Vulnerability is a term of such broad use as to be almost useless for careful description at the present, except as a rhetorical indicator of areas of greatest concern”*

- Timmermann, 1981

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Policy makers should take into account the **geographical vulnerability indicator** of their country and not underestimate different sub-indexes' implications





# THANK YOU FOR YOUR ATTENTION

Any Feedback is  
Welcomed

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