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# Population and Migration Visualization Project

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Project 3 | Team 8

Sezer Bozoglan

Brian Buxton

Hannah Miles-Kingrey

Nathaniel Trief

*What are relationships  
between the population  
density of a country and its  
migration trends?*

Research Question

# Methodology

- CSV: Kaggle - Population and Migration Density from the World Bank 1960-2018
- The World Migration Report
  - 10 countries with the highest number of emigrants



Photo by [Neelakshi Singh](#) on [Unsplash](#)

# Ethical Considerations

- The World Bank terms of use allow for copying, distributing, adapting, displaying or including their data for commercial and noncommercial use at no cost under a Creative Commons Attribution 4.0 International License.
- Certain agreements are expected, including:
  - ✓ Clear attribution to World Bank and particular dataset name or source (if known).



# Methodology

- Libraries/Tools/Resources
  - a. Transformation:  
CSV → JSON + GeoJSON
  - b. Leafletjs
    - i. HTML
    - ii. CSS
  - c. Charts.js
- MongoDB via Jupyter Notebook



Image generated using OpenAI's DALL-E, 2025.

# Product 1: Leaflet Map

Hannah M.

## Data

- Country data for 10 countries identified in the World Migration Report as having the highest migration numbers in 2020:
  - net migration rate
  - population density
- Geographic coordinates for each country's polygon

## Map Layers

1. **Migration markers** that display country name and net migration rates by year.
2. Population density
  - a. allows a user to select a year from a **dropdown menu**
  - b. **Choropleth** to show a country's population density
  - c. a **popup** shows country name, year, and density per sq/km.

# Product 2: Chart.js Line Graph

Nathaniel T.

-Data is deployed into graphs using chart.js and a universal country key.

-To access run deployment from Index2 referencing the logicv5.js file.

-Country key allows user to populate all graphs simultaneously.

## Migration and Population Visualization

Explore data trends in migration, population, and density over the years.

### Universal Country Key

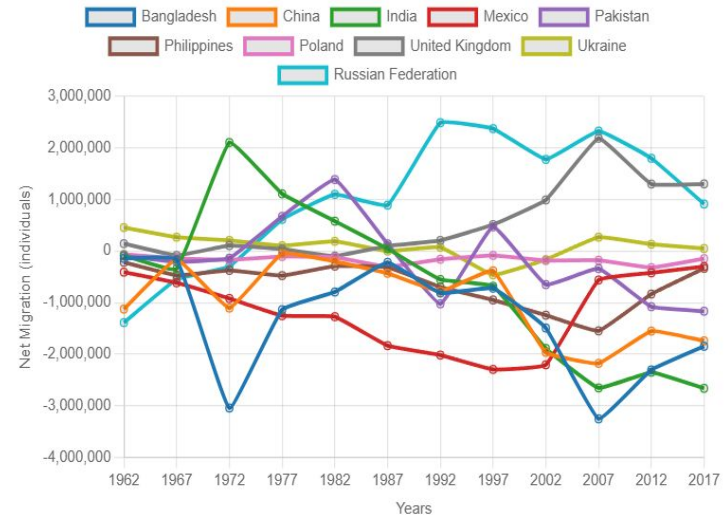
Bangladesh China India Mexico Pakistan Philippines Poland United Kingdom Ukraine Russian Federation

# Net Migration

- 1972 saw negative net migration in Bangladesh with positive net migration in India.
- High Net Migration in India, Russia, Pakistan, and the United Kingdom.
- Low Net Migration in India, Mexico, Bangladesh, China, Philippines.
- Negative net migration in Mexico prior to 2007. After 2007 relatively neutral.

## Net Migration (1962-2017)

This chart shows net migration trends for selected countries.



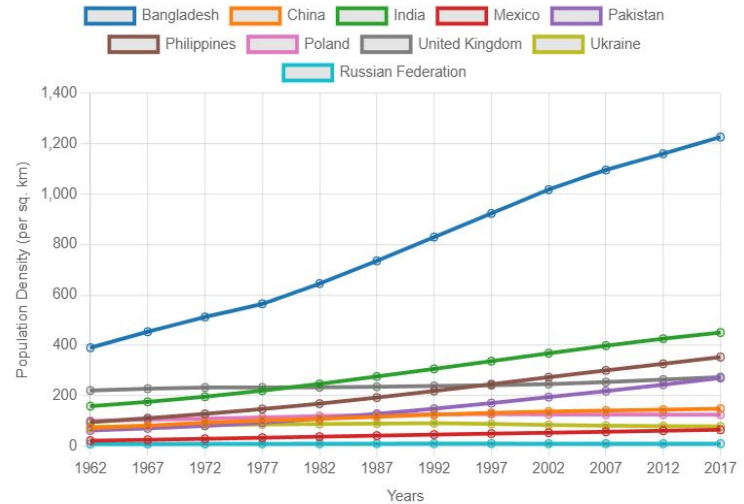


# Population Density

- Increasing most rapidly in Bangladesh
- Also on the uptrend in India, Philippines, and Pakistan.

## Population Density (1962-2017)

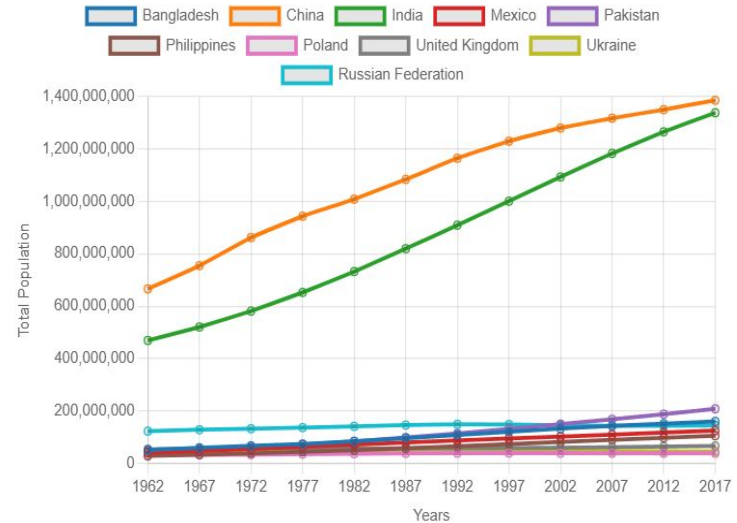
Track changes in population density (people per square kilometer).



- Total Population is highest in China and India



Visualize total population growth over time for selected countries.

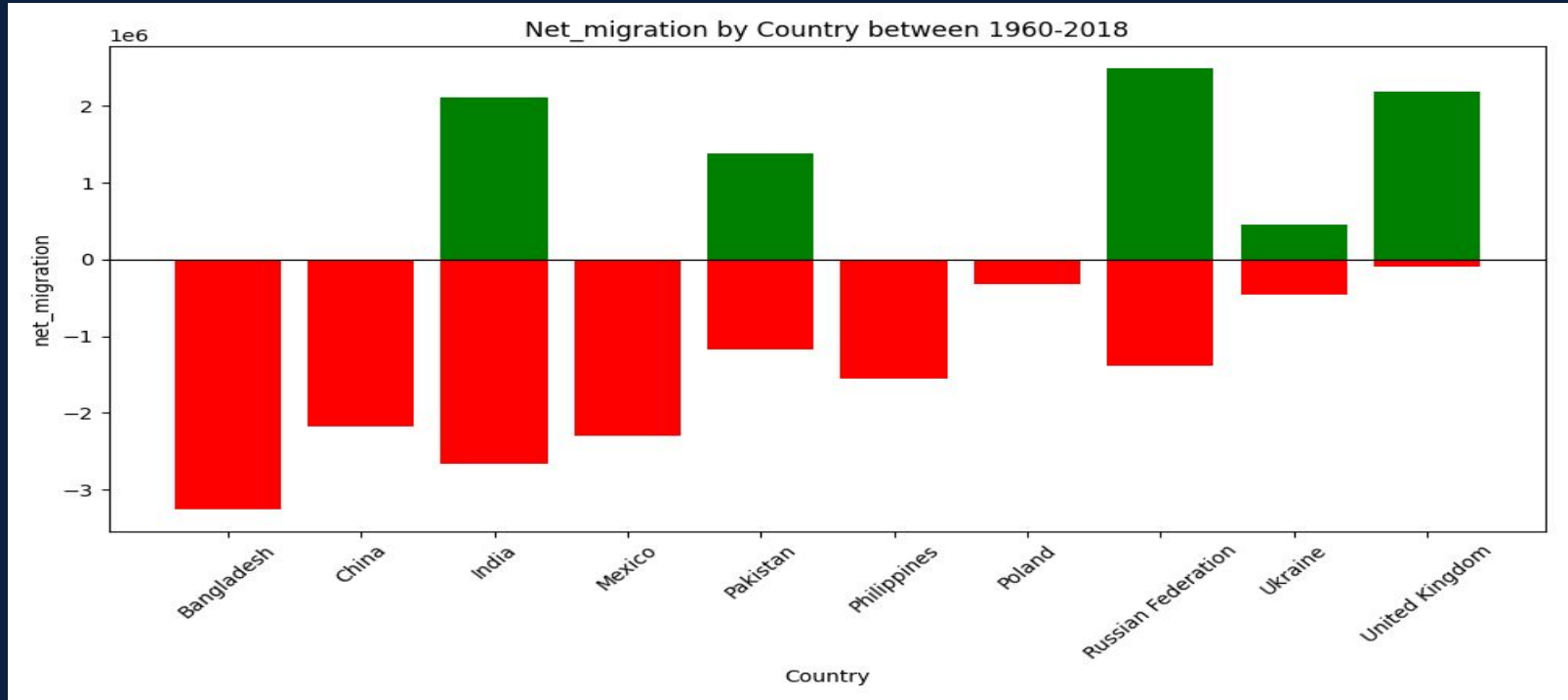


# Analysis

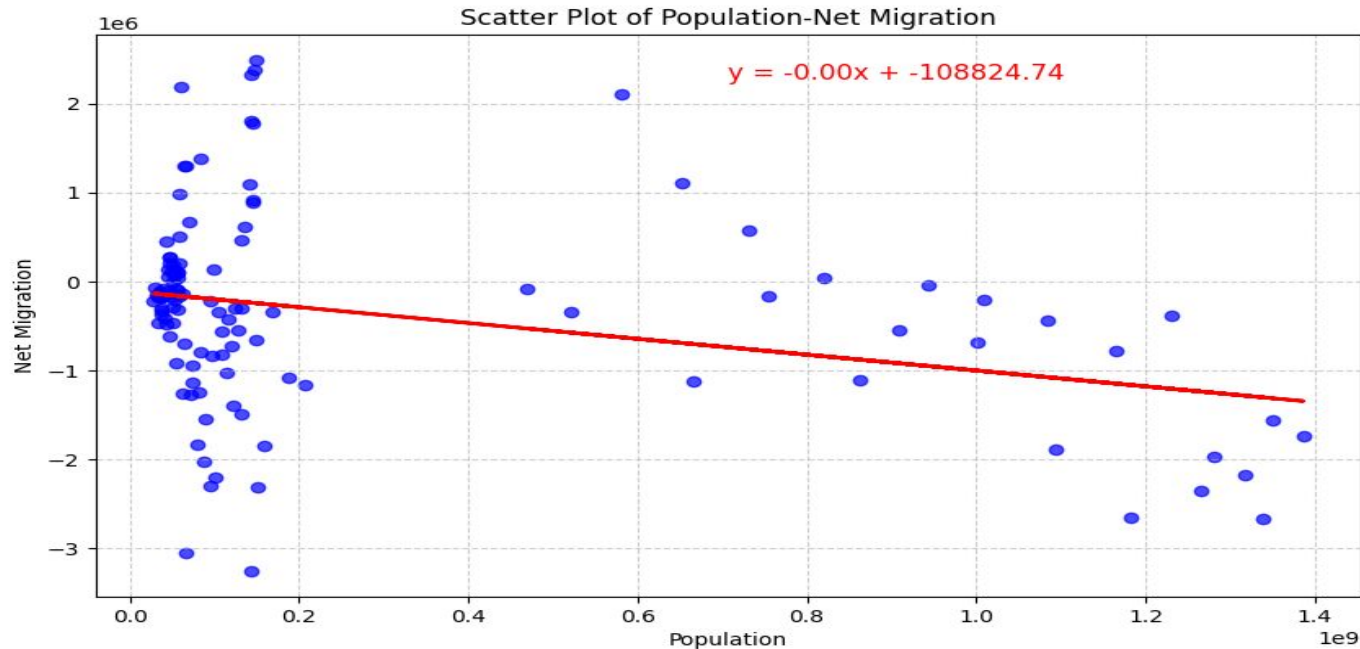
- **Bangladesh**
  - High population density that is continuing to increase (due to geographic constraints)
  - Negative net migration
- Highest net migration historically
  - **India** - 1972
  - **Pakistan** - 1982
  - **UK** - 2007
- **Poland** has stable population density AND stable net migration rates.
- **Weak correlation for population density and negative net migration.**

# Product 3: Python Analysis

## Net migration by Country Between 1960-2018

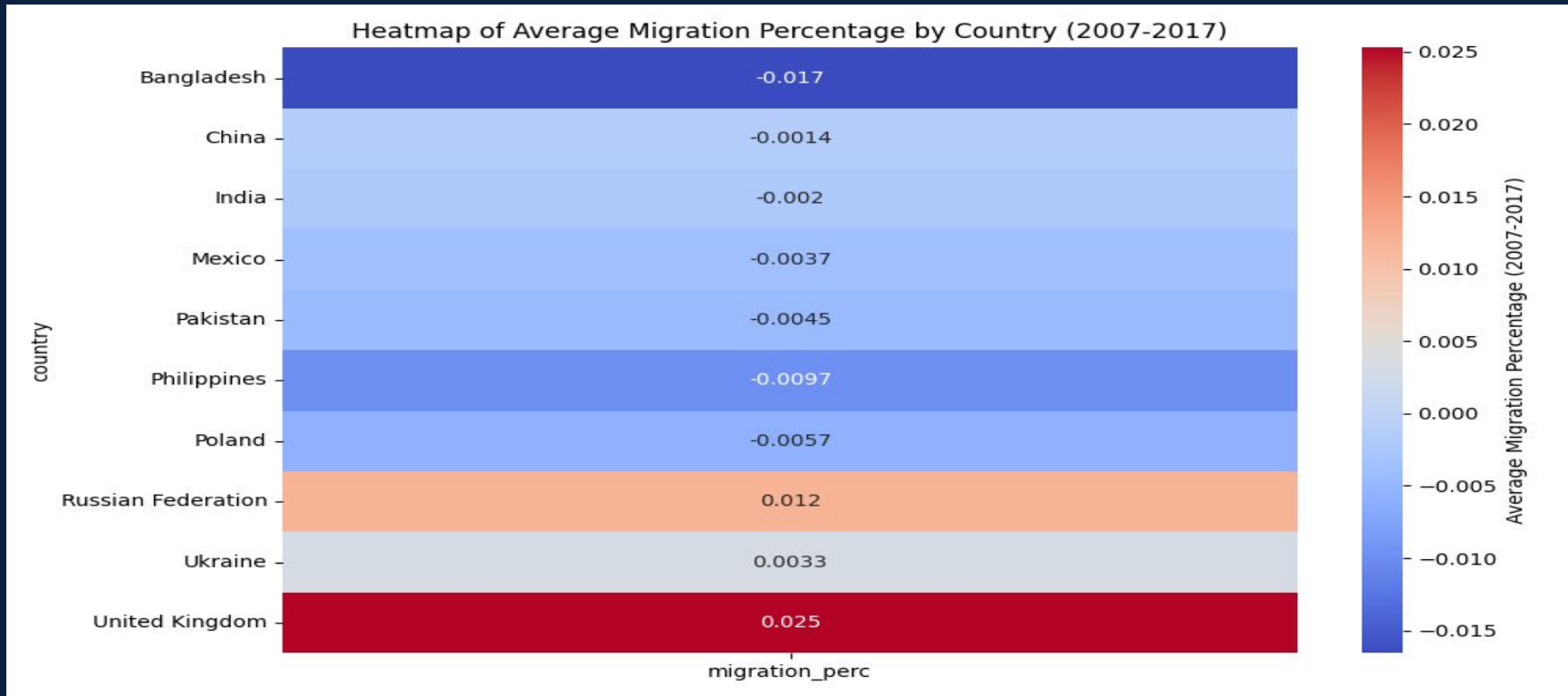


# Scatter Plots Between Net Migration and Population (Correlation is -0.3121 $r < 0$ )





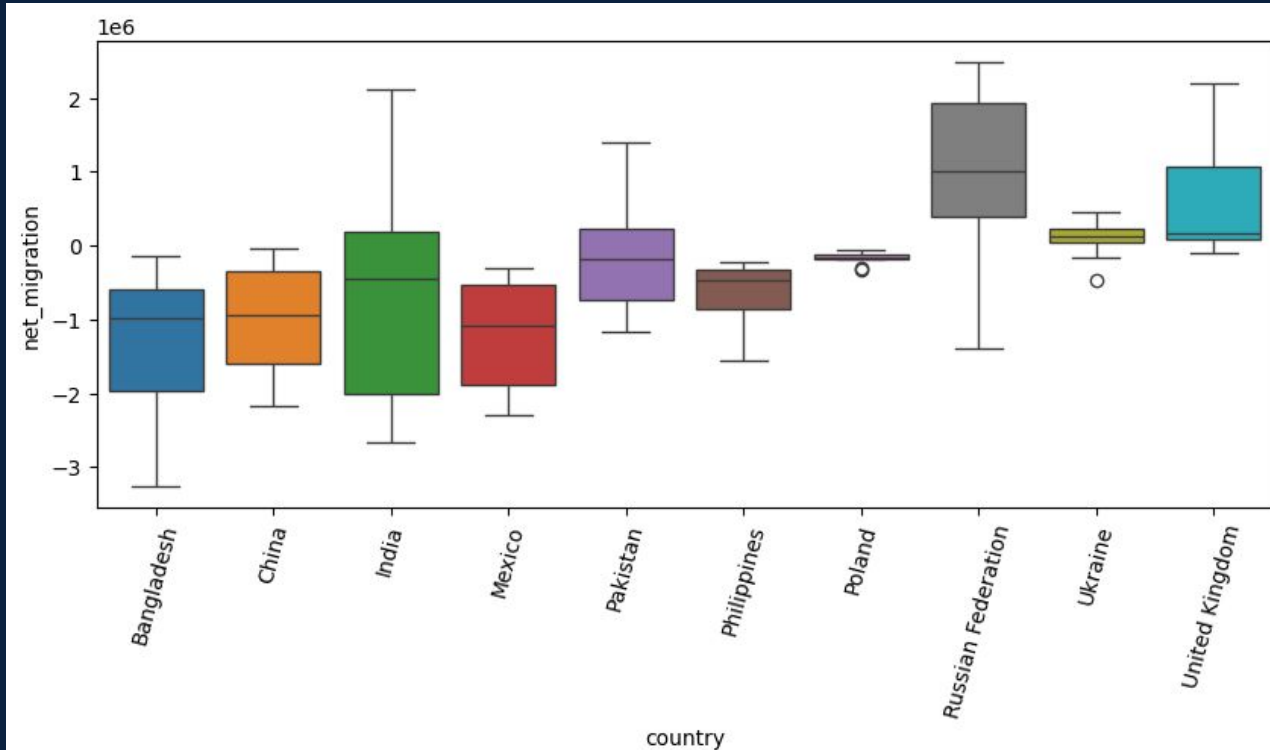
# Heatmap of Migration Percentage by Country (2007-2017)



# Product 4: Seaborn Boxplots

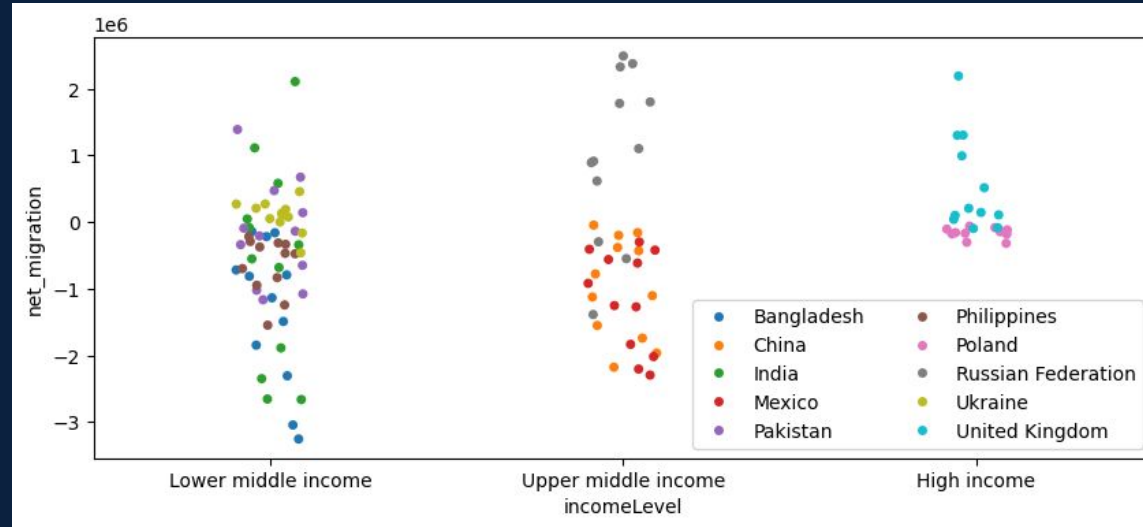
Brian B.

## Net Migration by Top Country



# Net Migration by Income Level

- Correlation of .20 with p-value of  $6.9 \times 10^{-22}$
- Shows connection between migration and hope for better pay by moving from a country of lower income to higher income.
- Net migration appears to be varied likely due to some migrating in from lower income areas and some moving out to areas of higher income.



# Why do people migrate?

## People migrate for many reasons, including

- Work
- Family
- Education
- Cultural/Political
- Wars
- To escape conflict
- Persecution
- Climate change
- Global events

## Conclusion

This **net migration analysis** highlights:

- **Economic and political factors** influence migration trends.
- **Developed countries (United Kingdom, Russia)** see **higher inflows** of migrants.
- **Developing countries ( Bangladesh, Mexico, Pakistan)** experience **more out migration** due to job-seeking and economic reasons.

### Regional Trends

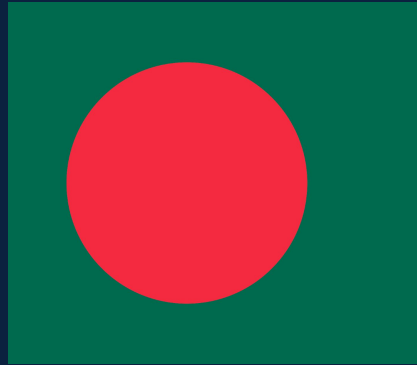
- **European countries** (UK, Russia, Poland, Ukraine) show **mixed migration trends**.
  - The **UK and Russia gain migrants**.
  - **Poland and Ukraine** have relatively smaller shifts, but Poland leans towards **negative migration**.
- **South Asian and Southeast Asian countries** (Bangladesh, India, Pakistan, Philippines) tend to **lose migrants**.

# Future Exploration: Three Stories



## UK, 2007

In 2004, “when eight Eastern European countries joined the European Union in May 2004, the United Kingdom...Ireland and Sweden, **allowed nationals from these new Member States to work without any restrictions...** The booming UK economy proved an attractive destination for many...citizens.”



## Bangladesh, 1972

This was a politically tumultuous year as Bangladesh had recently declared independence from Pakistan.

High population density that is continuing to increase (likely due to **geographic constraints**)



## Mexico

- 1985 - Earthquake in Mexico City kills thousands and makes many more homeless.
- 1994 - Chiapas Rebellion
- 2007 - Tabasco state flood; ~500,000 are made homeless



**Thank you!**  
***Any questions?***