Analysis of Battle-related deaths during natural resource conflicts in Latin-America from 1989 to 2006

1. Introduction

Nowadays, wars are still occurring, with the main reason for invasion being natural resources. Unfortunately, the locals are also affected, which leads to an increasing number of deaths. The aim of this project is to distinguish the most devastating years in which the greatest number of civilians were killed, as well as the countries in Latin America where the most calamitous wars happened from 1989 to 2006. The study also helps to identify the main causes of protracted conflicts over natural resources. The area of research is a Latin America, which is generally understood to include the entire continent of South America, plus Mexico, Central America and the islands of the Caribbean.

1.1 Questions

- 1. Which were the top 5 most violent opposing groups, who killed the most number of civilians?
- 2.1. What were the top 5 years/countries in which most civilians were killed in natural resource conflicts in Latin America?
- 2.2 What were the mechanisms by which violent natural resource conflicts were affected from 1989 to 2006?

2. Data Sources

2.1 Descriptions of Data Sources

Datasource Name	Description	Availability	Data Type	Geographic Coverage
The Natural Resource Conflict Dataset	Codes whether internal armed conflicts are clearly linked to natural resources from 1946 - 2006.	[1]	Stata	Global, covering multiple regions
UCDP Battle-Related Deaths Dataset version 24.1	Contains data on battle deaths (soldiers and civilians killed in combat) in state-based conflicts for 1946–2008.	[2]	Zipped CSV	Global, covering multiple regions

2.2 Licenses and Permissions

Since both datasets, The Natural Resource Conflict Dataset and UCDP Battle-Related Deaths Dataset version 24.1, belong to The Peace Research Institute Oslo (PRIO), we could look at licences and permission denoted by this organization. At this web page

you could find this information:

`...open data policies benefit Norwegian social science – and PRIO in particular...All data collection efforts at PRIO are openly available...` from [3]. This proves that they are under a standard open-data license. Additionally, it was included that, in order to use theirs datasets for a research purpose, you need to include the references to these papers, where they were first presented. You could cite it from [1] and [2].

2.3 Data Pipeline

ETL (Extract, Transform, Load) Process:
The data pipeline was implemented for two datasets using Python. It consists of several steps provided below:

Pipeline Name	Extract	Transform	Load
Natural Resource Conflict Dataset Pipeline	Reads metadata and downloads Stata files.	Filters rows, removes unnecessary columns, standardizes data format, filters manually for Latin-America countries, removes empty cells and duplicates, adds a `years` column from `start_date` and `end_date` and check if they are not the same.	Stores transformed data in SQLite database as `conflicts.sqlite`.
UCDP Battle-Related Deaths Dataset Pipeline version 24.1	Reads zipped metadata and downloads CSV files.	Filters rows, removes unnecessary columns, filters automatically for Latin-America countries, renames `location_inc` to `location` for consistency with the first pipeline, removes empty cells and duplicates.	Stores transformed data in SQLite database as `deaths.sqlite`.

More information regarding which transformations and cleaning steps were done and why you could find in a previous section `2.2 Structure and Quality of Data Sources`.

2.4 Combined Table

Table 1. First row of final Dataset, which combines The Natural Resource Conflict Dataset and UCDP Battle-Related Deaths Dataset

Location	Government	Opposing Group	Year	Deaths	Whole_days	Begin	End	Distribut Mechani
Guatemala	Government of Guatemala	URNG	1989	82	10,957	1996	1995	1

The final table was created after applying our ETL pipeline to two previously mentioned datasets. By using SQLite operations INNER JOIN, it was saved as a CSV file

`combined_dataset.csv` . To the Deaths table belongs information about: location, goverment , opposing Group, year, Deaths, when for Conflicts - Whole_days, Begin, End, Distribution Mechanism, Aggravation Mechanism and Financing Mechanism.

All data types are discrete, belonging to categorical data type, e.g. location, goverment, opposing Group, and all others to numerical.

3 Analysis

Using SQLite queries I get the results in the forms of tables, which were saved as CSV files, e.g. "quest{}.csv".

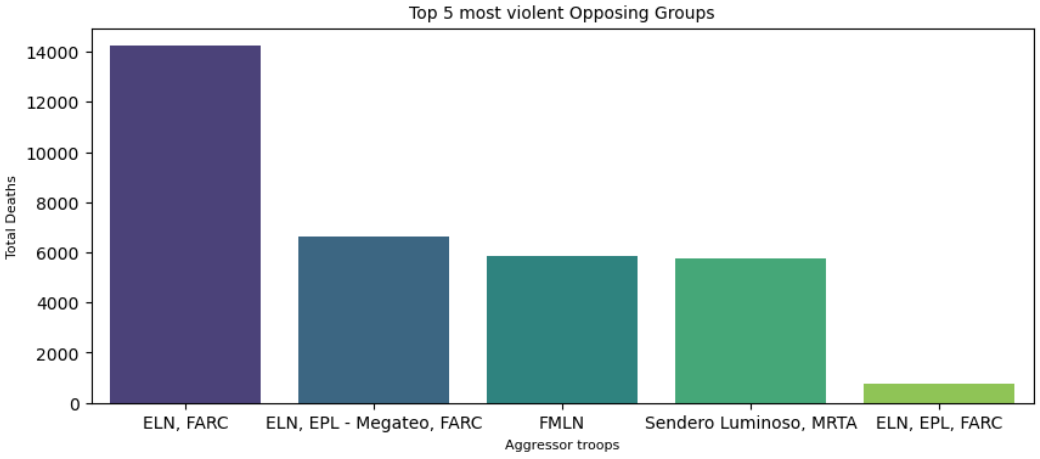
1. 

Fig 1. Top 5 most violent Opposing Groups

In Figure 1, the bar chart shows the top 5 most violent opposing groups from 1989 to 2006. However, the most bloody aggressor forces were the ELN and Farc in Colombia, who killed 21586 people in 17 years.

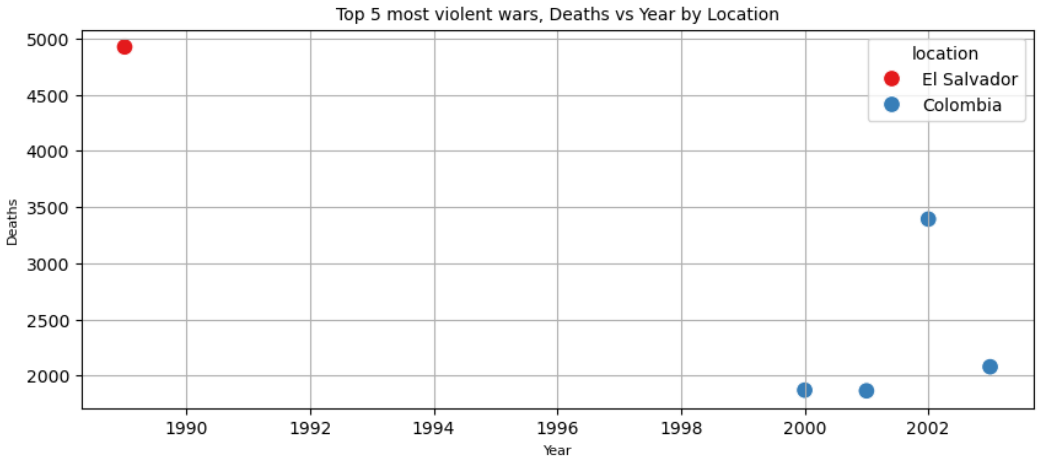
2. 

Fig 2. Top 5 most violent wars based on year and location

In Figure 2, the scatter plot shows the top 5 most violent wars by year and location. Thus, the worst situation was in 1989 in El Salvador, where the largest number of civilians killed was 4924.

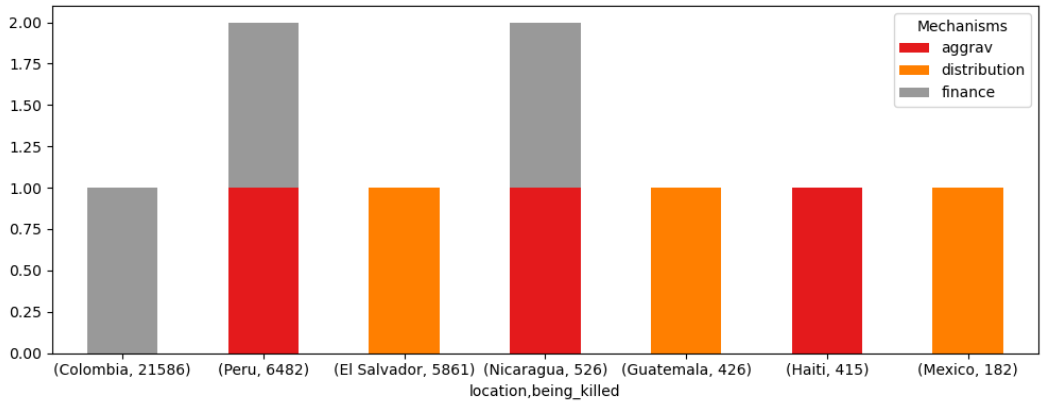
3. 

Fig 3. Mechanisms over Location and number of killed civilians

In Figure 3, the scatter plot shows the mechanisms by which violent natural resource conflicts were affected from 1989 to 2006. Thus, the worst conflicts were in Colombia, where the largest number of civilians killed over 17 years was 21586. It happened due to financing mechanism, where Rebel groups use natural resources to finance rebellion. The second most cruel wars happened in Peru (6482 killed) due to financing mechanism and aggravation mechanism, where natural resource issues aggravate an ongoing conflict. The Third most cruel natural conflict was in El Salvador (5861 killed) due to distribution mechanism, where disagreements arise over distribution of natural resources or revenues. In conclusion, the most common cause of natural conflicts, which leads to enourmous amount of deaths among civilians, was due to financing mechanism.

3. Conclusions

The results derived from this project state that the most devastating conflicts were happened in Colombia due to financing mechanism, where Rebel groups use natural resources to finance rebellion, due to ELN and Farc forces, who killed around 21586 civilians. It is complicated to calculate the amount of killed people by each of the aggressor organisation, because those troops were working in cooperation with another, e.g. 1. ELN and Farc or 2. ELN, EPL-Megateo and Farc.

References

1. The Natural Resource Conflict Dataset- Web page.
2. UCDP Battle-Related Deaths Dataset version 24.1 - Web page.
3. PRIO license.
4. UCDP Battle-Related Deaths Dataset version 24.1 - Link to the article.