

# Spatial Analysis of Direct Violence and Environmental Impacts in Colombia:

## A Geographic Review of Conflict Events from 1989 to 2018

Maria Camila Posse Gaez

Keough School of Global Affairs, University of Notre Dame

### INTRODUCTION & RESEARCH QUESTION

Using **ArcGIS software**, this project assesses the **geographic distribution of the armed conflict in Colombia**, looking specifically at (i) the locations of three types of conflict events, (ii) their spread vis-à-vis urban and rural areas, and (iii) their relationship to environmental degradation, specifically trends in deforestation.

The following maps illustrate **which regions in Colombia have been most and least affected by the ongoing conflict**, both in terms of direct violence and environmental impacts.

The time frame of analysis for this research were the past three decades of the Colombian armed conflict, from **1989 to 2018**.

### METHODOLOGY

To investigate which regions have been most and least affected by armed conflict since 1989, this project collected **georeferenced conflict event data** and **forest-no forest information** from academic and government institutions, respectively.

Conflict data was gathered from the **Uppsala Conflict Data Program (UCDP)**. Data on the state of the forest-no forest boundary, established by the Colombian government in 2010, was gathered from **national environmental institutes**.

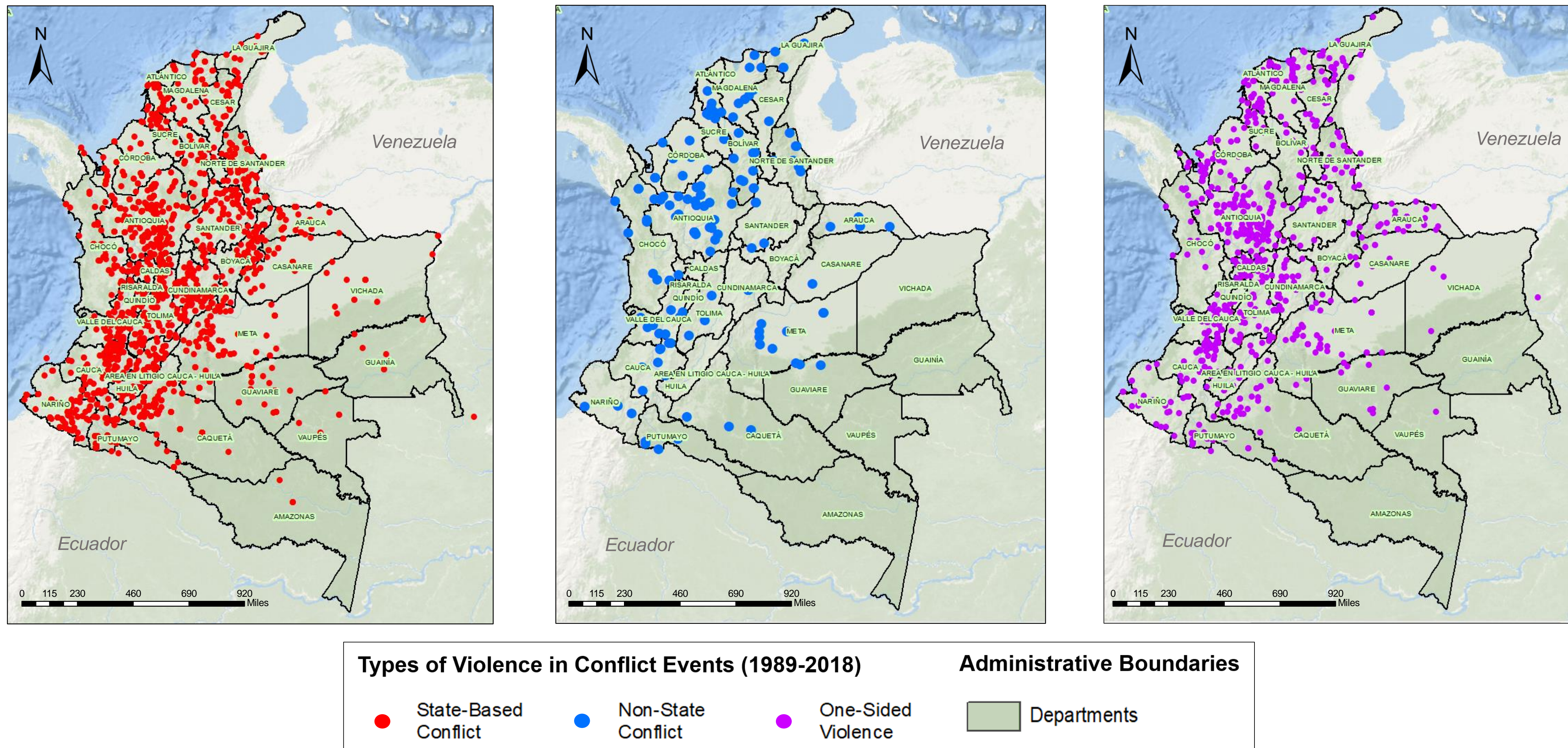
Conflict events were differentiated based on the actors involved. Three types of conflict events were studied: **state-based, non-state based, and one-sided**. These include confrontations between the government and guerrillas, guerrillas vs. guerrillas, and attacks against civilians from either side.

- **First**, the 3 types of events were mapped onto the Colombian geography, depicting which regions of the country were affected by specific types of violence (**Fig. 1**).
- **Second**, a spatial join between conflict events and administrative boundaries revealed the count of events per department. This data was used to illustrate the comparative higher prevalence of conflict in certain areas of the country (**Fig. 2**).
- **Third**, an analysis of conflict hotspots vs. areas with high rates of deforestation was developed. Regions in which the forest-no forest boundary moved over time (a measure of deforestation) were identified from raster data. The raster layer was digitized into a point layer, and a 50,000KM buffer was created around said points to identify areas of high deforestation (**Fig. 3**).

### FINDINGS

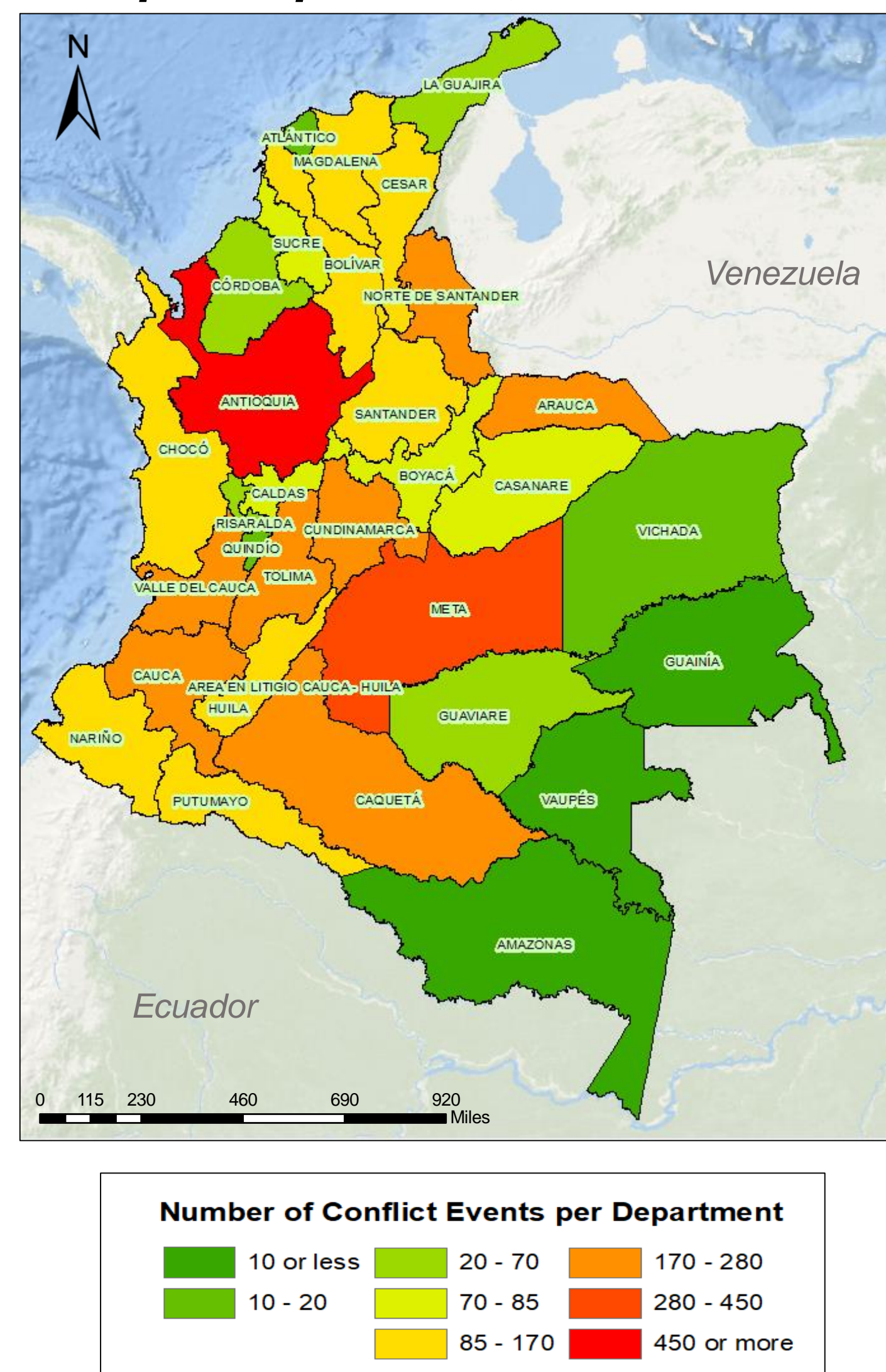
The most common types of conflict events, between 1989 and 2018, were either state-based or one sided. Their distribution is similar across types, with most of the conflict concentrated from the south-west corner to the north-east corner of the country. The following maps indicate that conflict, regardless of type, is broadly spread throughout the country with exceptions in very peripheral areas toward the south.

**Figure 1 – Distribution of Types of Violence in Colombia, 1989-2018**

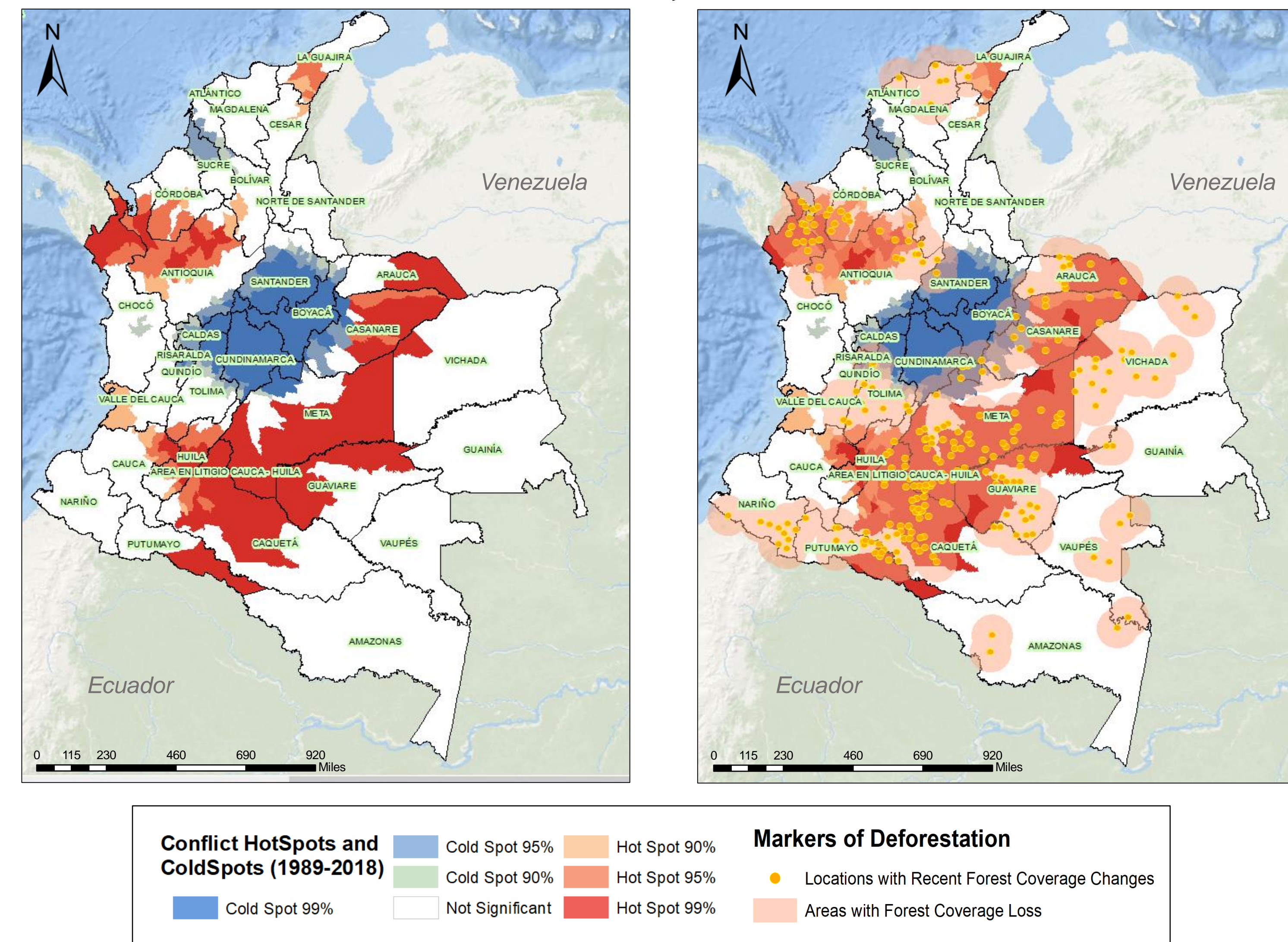


Choropleth analysis of the distribution of conflict, however, shows that certain departments were more affected by conflict than others. Antioquia and Meta saw higher counts of conflict events than other regions. Hot-spot analysis, moreover, demonstrates what the basic maps above obscure. Specifically, that the most urban areas of Colombia, in the center of the country, are conflict cold-spots. An overlay of deforestation distributions also demonstrates that where there is more violence, there is also more environmental degradation.

**Figure 2 – Conflict Events per Department, 1989-2018**



**Figure 3 – Conflict Hot Spots, Cold Spots, and Deforestation, 1989-2018**



### CONCLUSIONS

This analysis revealed that direct violence has historically been concentrated in two regions of Colombia. The first represents the departments of **Arauca, Casanare, Meta, Guaviare, Caquetá, Huila, Cauca, and Putumayo**, which make up the **Orinoquia and Amazon** regions and are **primarily rural areas**. The second region is the **northeast**, made up of **Chocó, Antioquia and Córdoba**. Except for Antioquia, which houses the second largest city in the country, these are also largely rural departments.

This research also shows that in the center of the country, in the **capital city of Bogotá** and surrounding areas, there is a critical **conflict cold spot**. It becomes clear that urban areas have been comparatively less impacted by direct violence.

In terms of environmental impact, **deforestation trends overlap with the areas most affected by direct violence**. Put simply, beyond direct violence, armed conflict also has important effects on environmental degradation. This relationship is most clear in the **Amazon region**, namely the departments of Meta, Guaviare, Caquetá, and Amazonas.

### IMPLICATIONS & FUTURE RESEARCH

Because the impact of armed conflict in Colombia, both direct and environmental, is concentrated in rural areas, **peacebuilding and development work must prioritize the protection of the most vulnerable departments**.

Moreover, **peace and sustainability** imperatives must be considered as **co-constitutive forces**: armed conflict has direct impacts on the lives of people but also on the future of sustainability. In the context of a global climate emergency, these matters cannot be considered independently.

Future research can look at the **specific elements of political or criminal violence that are driving deforestation**. This can involve drug trafficking, illegal mining, or transnational crime involving Ecuador and Venezuela. Also, **regressions relating types of conflict events and deforestation trends** could shed light on actor responsibility, for example.

### SOURCES & REFERENCES

- Administrative Cartography [sigot.igac.gov.co/](http://sigot.igac.gov.co/)
- UCDP Data [data.humdata.org/dataset/ucdp-data-for-colombia](http://data.humdata.org/dataset/ucdp-data-for-colombia)
- UCDP Codebook [ucdp.uu.se/downloads/ged/ged191.pdf](http://ucdp.uu.se/downloads/ged/ged191.pdf)
- Forest-No Forest Data [www.siac.gov.co/en/catalogo-de-mapas](http://www.siac.gov.co/en/catalogo-de-mapas)
- Geographic Base Map [www.esri.com/en-us/home](http://www.esri.com/en-us/home)