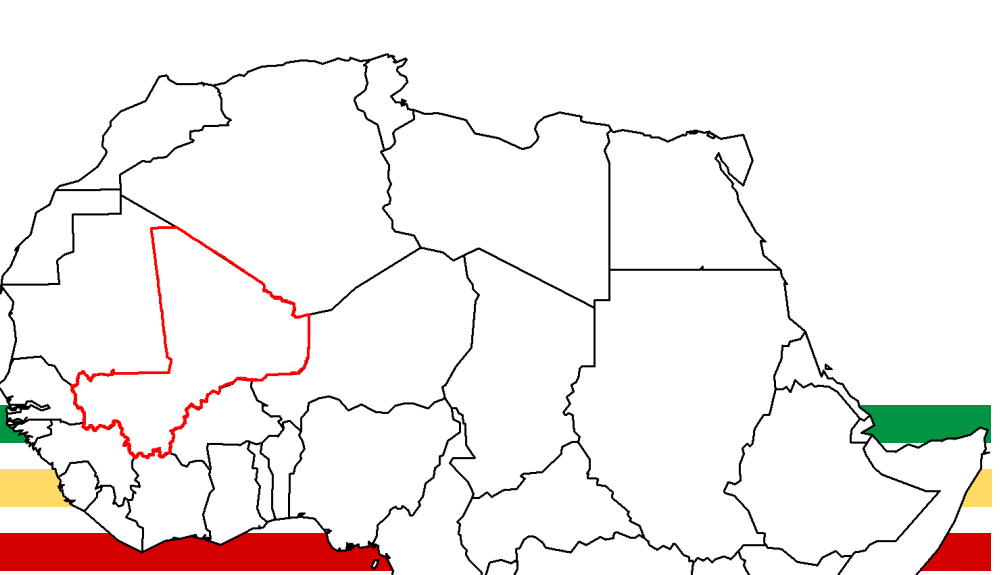


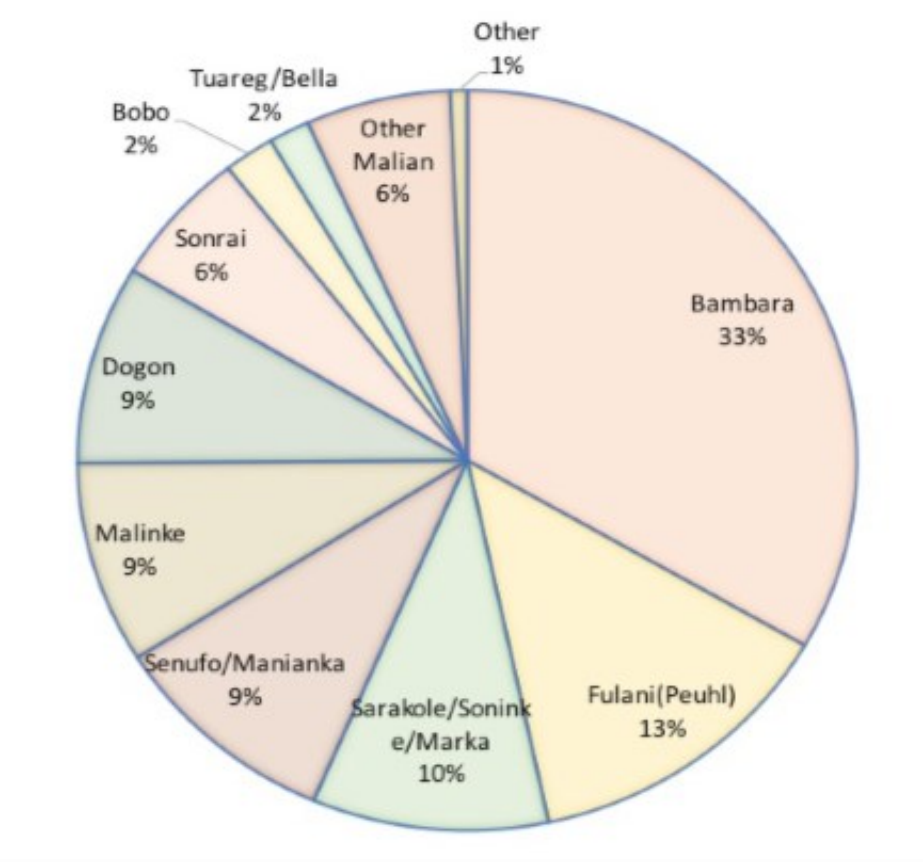
CRISIS IN THE CENTER MAPPING ETHNIC VIOLENCE IN MALI FROM 2012 TO 2018



BACKGROUND

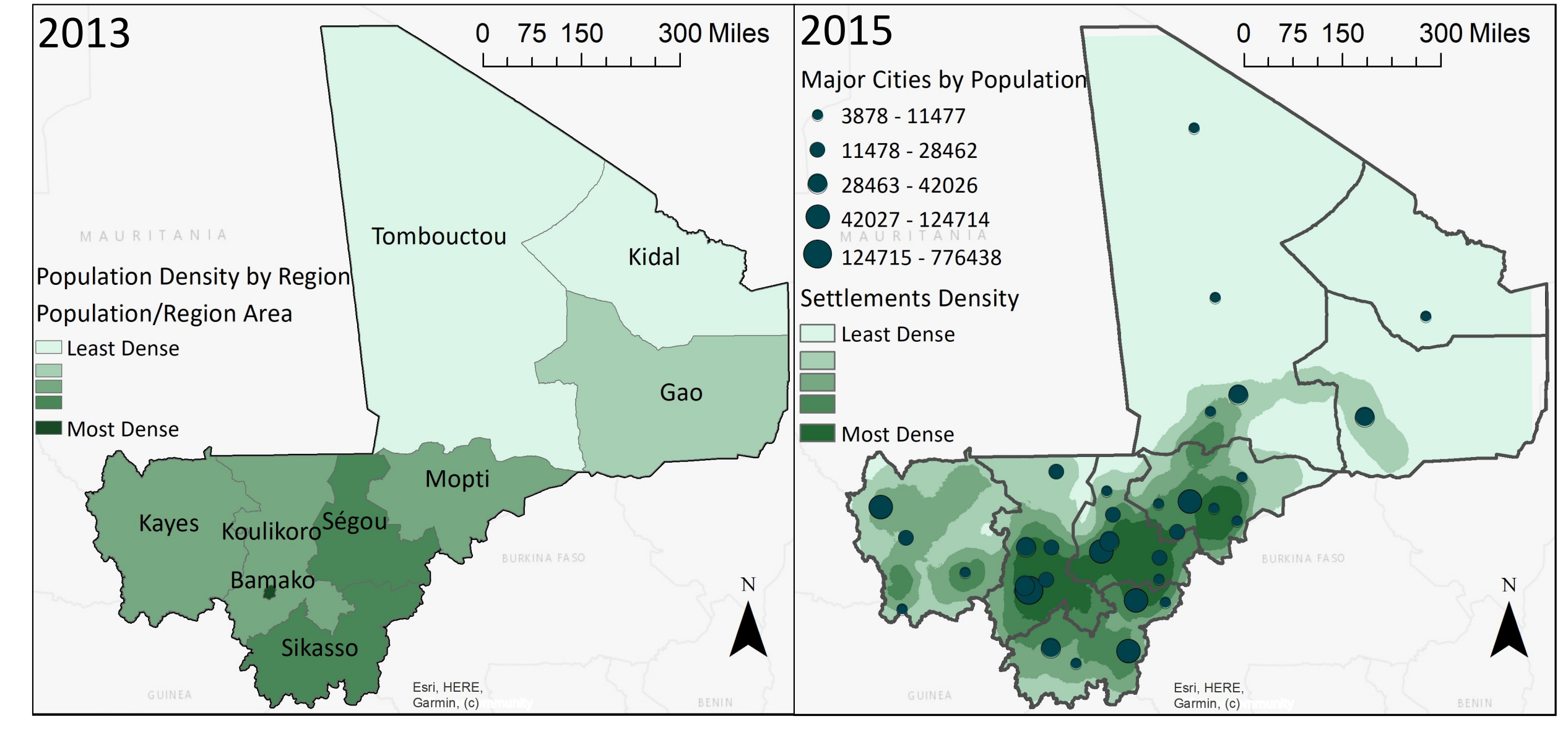
This project's purpose is to analyze where ethnic violence is taking place in Mali since the Tuareg insurgency in January 2012. Chaos from the insurgency created a power vacuum in the North, facilitating growing control by Islamic militants ("Africa: Mali – The World Factbook" 2019). While a French-led operation reclaimed the North in 2013, Islamic militant groups have gained control of rural areas in the Center ("Africa: Mali – The World Factbook" 2019). These groups exploited and encouraged ethnic rivalries in Central Mali, stirring up intercommunal violence. Mali's central and northern regions have faced lacking government resources and management, creating grievances between ethnic groups that rely on clashing livelihoods. Two of the key ethnic groups forming militias and using violence are the Dogon and Fulani. The violence between these groups is exacerbated by some of the Islamic militant groups claiming a connection to Fulani identity ("Mali in Crisis: The Fight between the Dogon and Fulani" 2019). The Bambara are the largest ethnic group in Mali and have also contributed to the violence. These are not the only identity militias, but the Dogon and Fulani are seemingly the most active. This project will analyze the density of ethnic violence and proximity to useful resources, such as major cities, roads, and the Niger river. This project also compares the density of ethnic violence in the first years of the crisis (2012-2015) with the latter half (2016-2018), when ethnic violence became a consistent threat. Finally, violence by event type is mapped to highlight the various forms of ethnic violence occurring.

MALI ETHNIC GROUPS (PERCENT OF TOTAL)



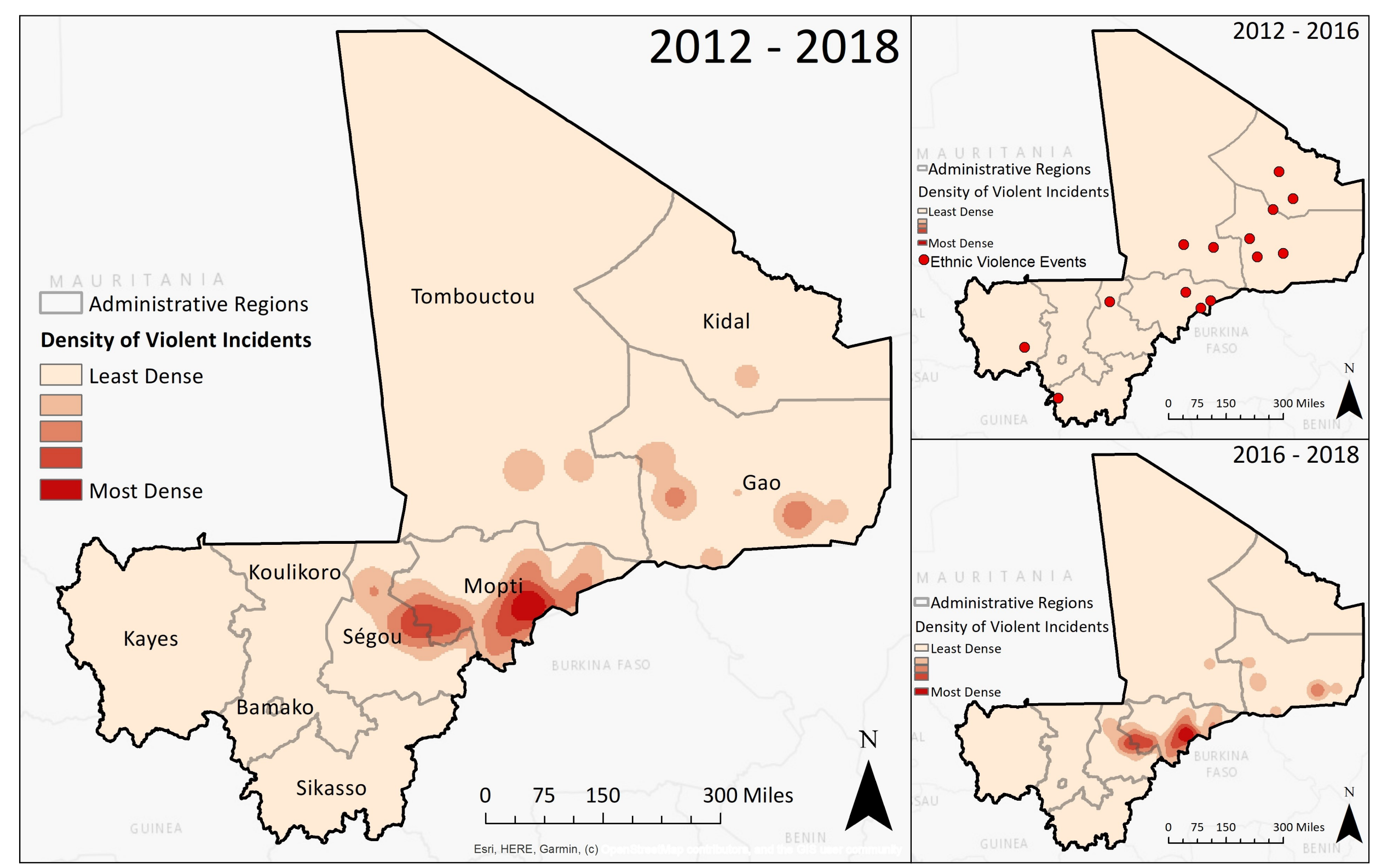
DATA

The conflict event data came from ACLED, which uses open source data and coordinates to record conflict events. This data was cleaned for dates and then 'actor' to ensure one actor was an 'identity militia,' which would be ethnic militias in Mali. This data could have errors due to data collection mistakes, but no signs of this were found. The water features, road, Malian border and administrative region boundaries are from 2018 (ESRI). The roads and water data missed some smaller features, but included critical features and were polygon layers, which were most important. Major cities' data and region population was from 2013 data collected by UN MINUSMA. This was the most recent population count available (census has not been conducted since 2009). OCHA provided 2015 data on the locations of settlements, or populated places, for Mali. The data is from the middle of the project's timeline and while there is likely changes since then, it is unlikely they would drastically change the density map.

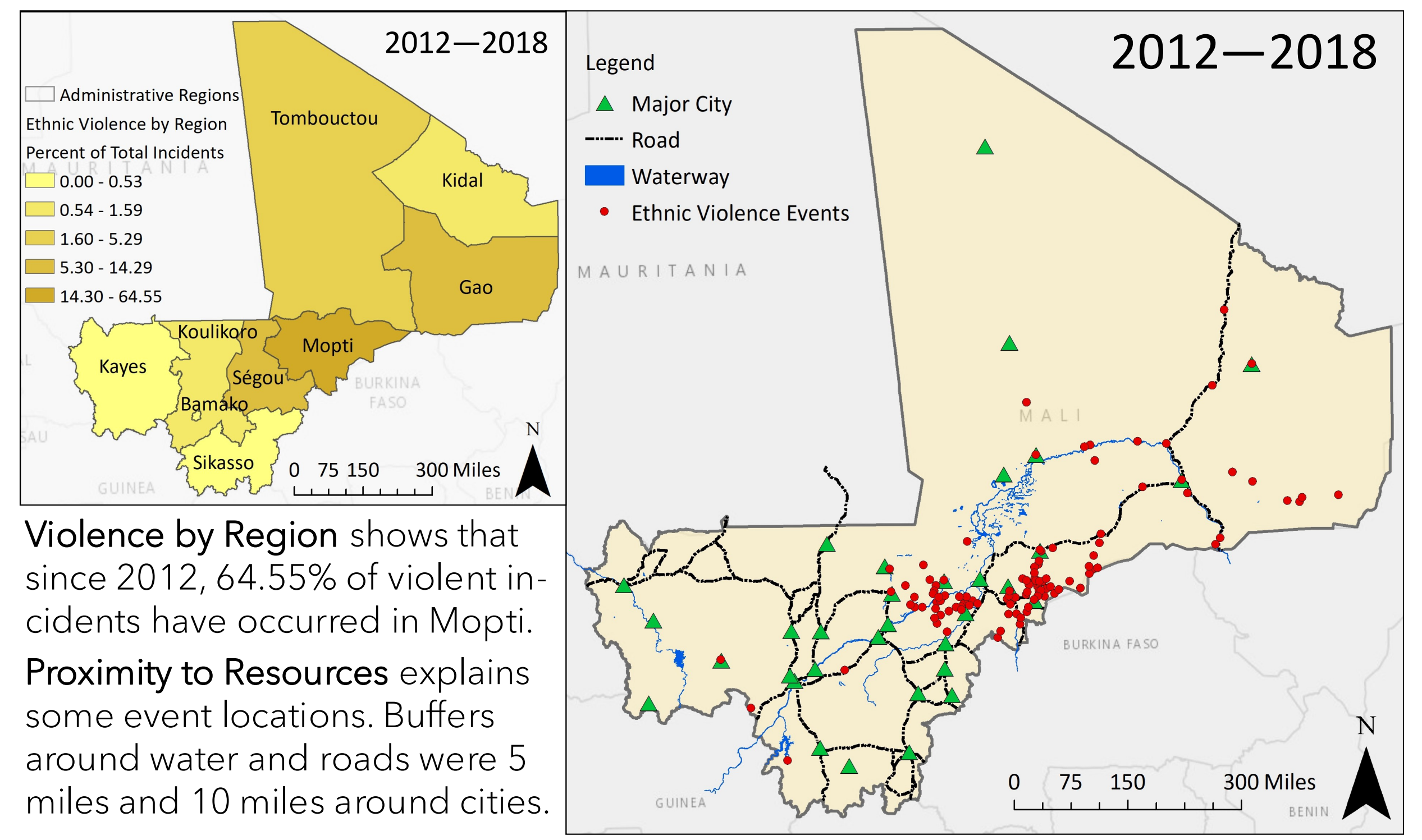


POPULATION

Density by Region shows that Bamako, the capital, is the most dense area. This map shows the divide in population between the South and the North. Density of Settlements show settlements are more concentrated in the South and Center, slightly shifted closer to the border with Burkina Faso.



Density of Ethnic Violence & Shifts Over Time are explained in greater detail in the results section.



METHODS

To create the population density by region map, total population was normalized by area of the region. This map was paired with a point density map for the settlements in Mali; no population field was applied because the purpose was simply to understand where villages were. Spatial analysis was performed using kernel density to determine where the concentration of ethnic violence has taken place. The population field used was 'none' so that each incident is weighted the same. The analysis was performed on the three different timelines to analyze any spatial changes over time. For all density analyses I relied on the default search radius and employed the planar method because the projection was fit for this and it was performed on a local area. Extract by mask tool was used to clip the output raster. Ethnic violence events were spatially joined to the regions layer in order to add a field and use the field calculator to calculate the percent of total ethnic violence in each region. In order to create the unioned buffer around waterways, major cities and roads, a buffer was first applied to each layer. Research showed motorbikes are common and there is a lacking public transportation system; this helped decide the buffer sizes. The 'within' option of the select by location was applied to find points within this buffer. The dissolve tool was applied to rid of any overlapping buffer areas. Symbolology by category was used to map the various event types.

RESULTS

The population maps showed a higher density of people and settlement in the South, with minimal activity in the North; this is consistent with relevant research and presents the divide between the two, fueled by imbalances in government resources. The age of this data (2013) is a potential source of error. The spatial analysis shows that ethnic violence is concentrated in the center of Mali, particularly Mopti and along that area of the Burkina Faso border. Conflict events near the border in Burkina Faso were not recorded, but could have aided in the analysis. There are two clear changes demonstrated by mapping kernel density of individual incidents from the beginning of the Malian crisis (2012-2015) and those from more recent years (2016-2018). First, the number of incidents has dramatically increased since the beginning years. Due to this, ethnic violence events were mapped on 2012-2015 density map to show where the events did occur. Second, the incidents shifted from more northern regions to the center of Mali. By mapping the percent of total ethnic violence by region, it is clear that ethnic violence from 2012-2018 concentrated in the Mopti region. The overlay analysis did not provide a clear result; about 46.8% of ethnic violence incidents occurred within the buffer around the river, major cities and roads. A higher percentage was expected because water is a critical resource, roads provide easier transportation and cities are more densely populated. The buffer gives context to some stray attacks, as some fall along a road or river, particularly in the North and South.

LIMITS

A major limit to this project was the lacking availability of data, like current population data. The density map of populated places could be potentially misleading because it is not reflective of numbers of individuals; this map was paired with the population by region map to address this concern. Information on demographics was sparse; mapping ethnicity (especially nomadic groups) is a controversial, complicated process.

FINAL THOUGHTS

Since 2012, ethnic violence has been concentrated in the center regions of Mali, specifically Mopti and along the border with Ségou. In the first three years of the crisis, there were relatively few incidents of ethnic violence and they were spread from the North to the Center. In more recent years of the conflict, ethnic violence shifted mostly to the Center, in Mopti. The violence seems to run along the border with Burkina Faso. Ethnic violence is not solely contained to areas close to resources like water, cities and roads. But, many incidents in the North and all in the South fall near these resources. Further research should explore any trends in the location of different event types. Analyses done showed that the Fulani are overwhelmingly the victims of violence against civilians. Further research could bring light to where Fulani civilians are being targeted and by who (proximity to perpetrators' villages, etc).

Dogon	<ul style="list-style-type: none"> Traditional hunters and sedentary farmers Creating own self-defense militias and joining Dozos (such as Dan Na Ambassagou)
Fulani	<ul style="list-style-type: none"> Semi-nomadic herders and some sedentary farmers Creating own self-defense militias and perceived connection to jihadist groups
Bambara	<ul style="list-style-type: none"> Mostly farmers Creating own self-defense militias and some joining Dozos

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 Projection: Africa Albers Equal Area
 Sources: ACLED, ESRIMap2018, ESRIMap10, UN MINUSMA GIS
 Photo: Jeanne Menjoulet, Flickr
 References: "Mali," The World Factbook, 2019; "Central Mali: Putting a Stop to Ethnic Cleansing." 2019. Crisis Group; "General Guides," ACLED; "Crisis in Mali," n.d., Responsibility to Protect; "Mali," 2017, Minority Rights Group; "Mali in Crisis: The Fight between the Dogon and Fulani," 2019, Al Jazeera

