

# Climate of Conflict: Populations in Syria Most Vulnerable to ISIL Recruitment

## Introduction

A changing climate that brings about droughts, hotter temperatures, and extreme weather events may have even more nefarious impacts than what is easily recognizable. Across the Middle East, droughts and desertification leave behind desperate farmers who struggle to make a living. Yet these dismal conditions for farmers are in fact optimal conditions for another group of people circulating this region- the Islamic State of Iraq and the Levant (ISIL).

ISIL recruiters have been shown to prey on regions undergoing these harsh environmental conditions where poor farmers may have no other choice but to join the terrorist organization in order to make a living (Barbut). Because of this, it is of utmost importance to identify the regions where ISIL is likely to recruit in order to prevent growth of the organization while it is still relatively weak and lacks power. My research explored which regions in Syria are home to the populations most vulnerable to ISIL recruitment based on environmental and socioeconomic factors. The factors I included in my analysis were precipitation, soil quality, proximity to a freshwater source, the rate of economic activity, the percentage of farmers in the population, and proximity to a recent ISIL attack (Barbut).



Widespread drought and desertification across the Middle East

Image Credits: Global Support Program, Iraqi Civil Society Solidarity Initiative, Qasion News, and Mother Syria Assembly

## Methods

This vulnerability analysis was created using reclassified raster data and a raster calculation that gave each cell a score from 1 to 9, 1 being the most vulnerable regions, and 9 being the least vulnerable (See Table 1). This process involved converting much of the data into a raster format, as the precipitation data was the only file that came as a raster. The soil data came as a table and contained geographic coordinates, so it was projected onto the map as XY data. Because this data set included many soil quality parameters, a separate raster calculation was done to create a soil quality index (See Table 2). The Inverse Distance Weighted (IDW) tool was used to interpolate the points into a raster data set. Here it should be noted that this data did not cover the entire country, and is only a rough estimate of the soil conditions in between points where the soil data was actually collected. The data on 2019 ISIL attacks included city and village names, so the points were geocoded and then projected onto the map. This data and the freshwater vector data were converted into rasters using the Euclidean Distance tool, displaying proximity to these sites. Data on economic activity and agricultural workers were uploaded as vectors, and then converted into rasters using the Vector to Raster tool.

All data was clipped to the Syria country boundary. Once all the rasters had been reclassified to a score of 1 to 9, the Raster Calculator was used to create a vulnerability index. Each factor was given equal weight in the equation as there has not been research to suggest that certain factors have a greater influence on ISIL recruitment targets than others. It should be noted that in the figures below each data layer is displayed in a format that is most visually understandable, but all data was analyzed in raster format.

Table 1

Factor	Rating	Description
Precipitation (in mm/month)	Low (9) : 1 High (147): 9	Data for the month of November in 2000. November is the month with the median rainfall annually, and marks the beginning of the growing season, thus an important month for tracking drought (FAO).
Soil Quality	Low: 1 High: 9	Separate Index created (See Table 2) using information from Shapiro et al, the USDA-NRCS, and the University of California
Freshwater Proximity (in km)	Low (0): 9 High (240): 1	Lakes and rivers in Syria
Recent Attack Proximity (in km)	Low (0): 1 High (240): 9	ISIL attacks in 2019, crowdsourced from various news articles reporting attacks
Economic Activity (%)	Low (38): 1 High (57): 9	The percentage of the population making up the labor force, often an indicator of economic prosperity (Amadeo)
Agricultural Laborers (%)	Low (<1): 9 High (70): 9	The percentage of people working in agriculture in each district

Table 2

Parameter	Carbonate (g/kg)	Cation Exchange Capacity (cmol/kg)	Electrical Conductivity (dS/m)	Organic Carbon (g/kg)	pH	Sand %
Rating	Low (0): 1 High (580): 9	Low (0): 1 High (63.9): 9	Low (0): 9 High (59.5): 1	Low (0.9): 1 High (25.3): 9	Low (6.9)- 9 High (9): 1	Low (2): 1 High (80): 9

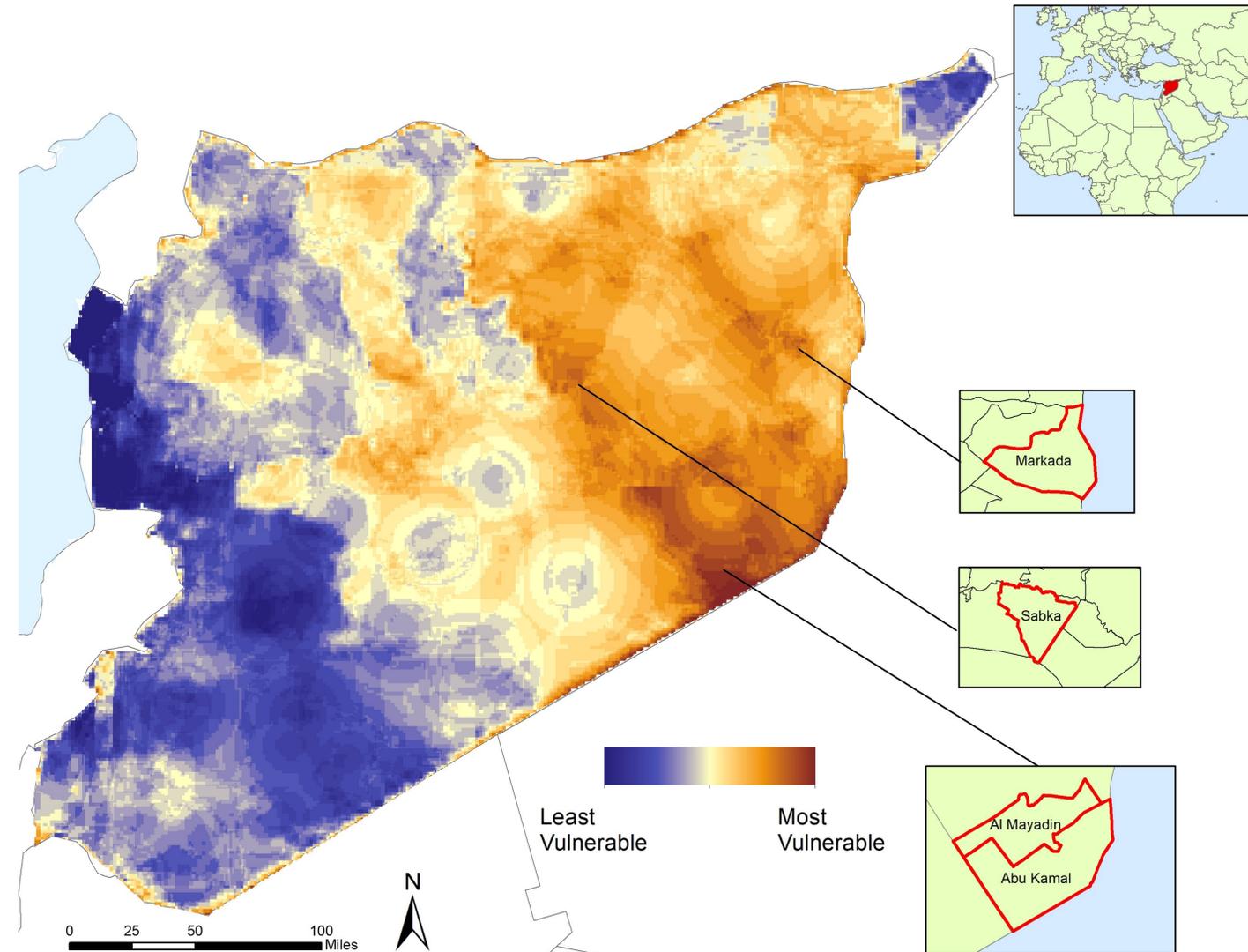
## Results & Discussion



Abu Kamal (top) and Al Mayadin—Syria's most vulnerable districts

The regions with the highest vulnerability were the districts of Abu Kamal and Al Mayadin, and the subdistricts of Sabka and Markada. Abu Kamal and Al Mayadin are border districts, separated by the Euphrates River, that were especially hard hit during the Syrian Civil War and were some of the last regions under ISIL's control until being taken over by the Syrian Army in 2017 (Majidiyar). Sabka and Markada are located in the districts of Al Raqqa and Al Hasakah, respectively. Both subdistricts were the sites of major battles during the Syrian Civil War (Hassan).

One interesting aspect of the data was a discrepancy between precipitation and soil quality. One would expect that areas experiencing the greatest drought conditions (the lowest precipitation) would have the poorest soil quality. The data layers certainly show a positive correlation between precipitation and soil quality, yet the region of lowest precipitation in southwestern Syria has relatively good soil quality. It could be that the data not representative enough of normal conditions in this region, or there could be other factors contributing to the improved soil quality in this region, such as low input farming.



This analysis could have been improved by not only including data on other factors influencing recruitment, such as education, but also more data on the factors that were used. For example, soil data must be collected from many more sampling sites that span across the entire country. It is also of great importance to include more representative precipitation data, such as an annual average from a more recent year. It would also be helpful to have full coverage data on economic conditions and additional measurements of poverty.

This map, however, is an initial view of where people are most vulnerable to ISIL recruitment in Syria, as the data clearly shows which regions contain the most risk factors. This would be very useful information when considering foreign aid, as one way to fight terrorism without military occupation is to provide humanitarian aid to vulnerable regions. Preventing recruitment is a key part of counter-terrorism efforts, so improving conditions in vulnerable regions may be an important preventative measure.

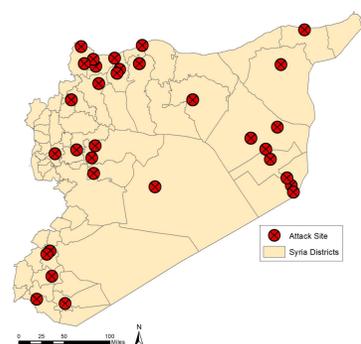


Cartographer: Louisa Kimmell  
Introduction to GIS | May 6, 2019  
Projection: WGS\_1984\_UTM\_Zone\_37N

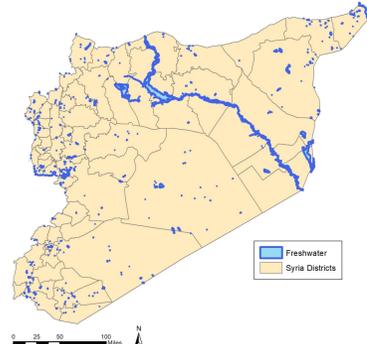
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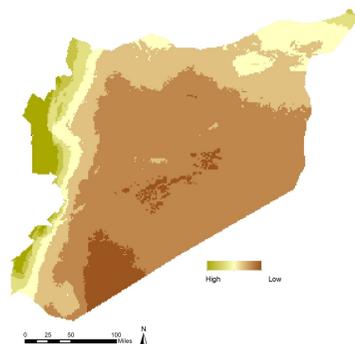
## 2019 ISIL Attacks



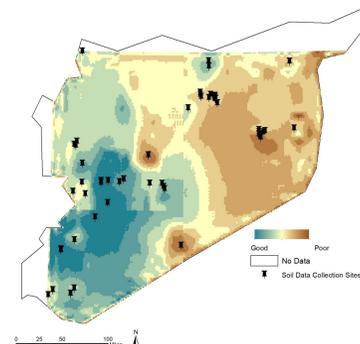
## Freshwater



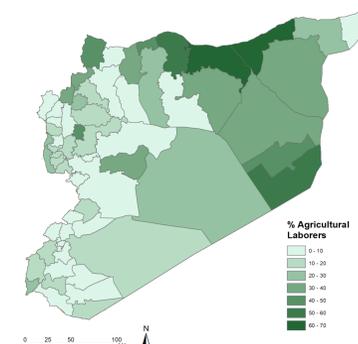
## Precipitation



## Soil Quality



## Agricultural Laborers



## Economic Activity

