Conflict Clusters: The Effect of Climate Vulnerability on Conflict Incidence in Africa

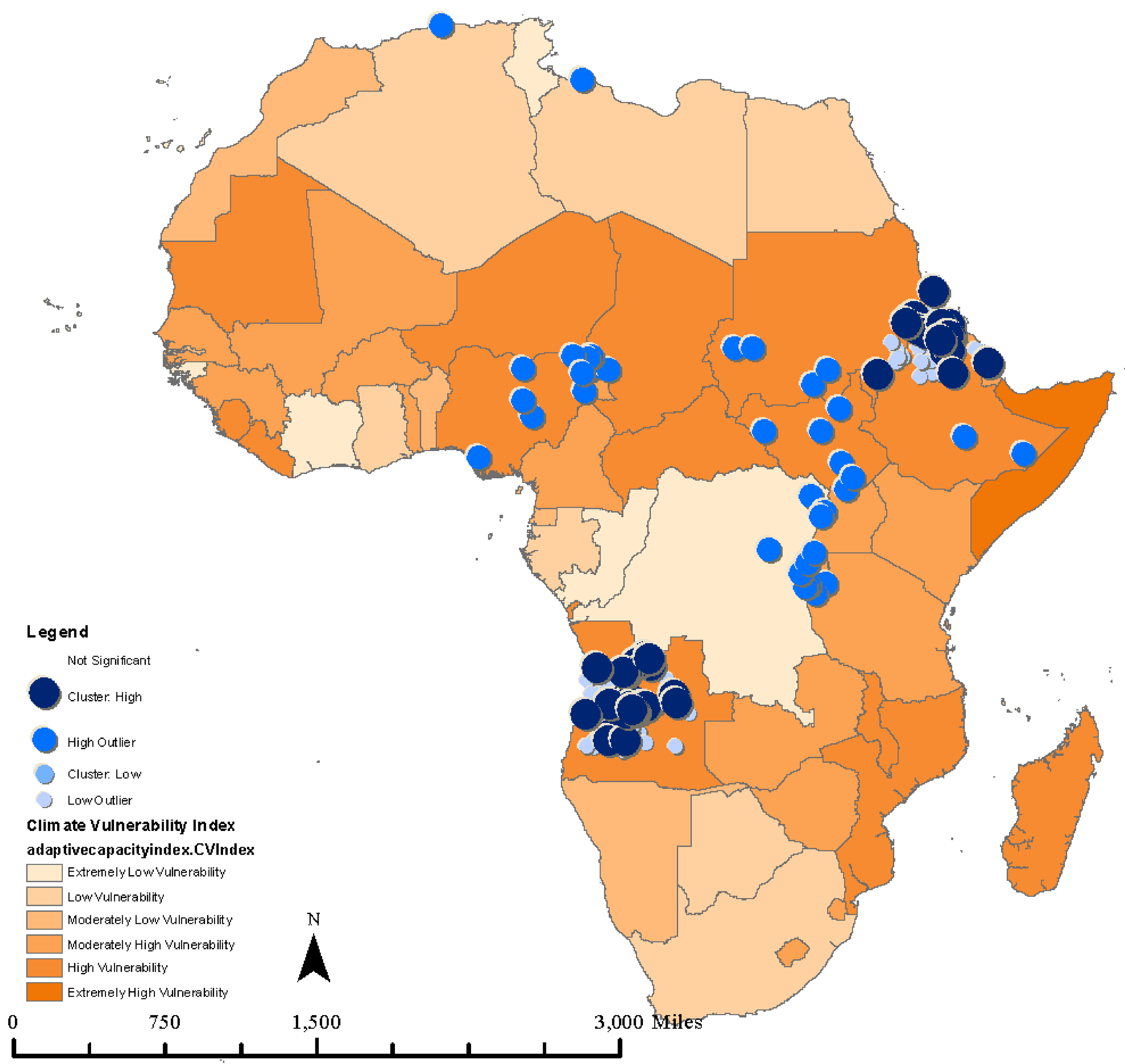
Abstract:

The purpose of this project is to analyze the distribution of conflicts across African countries based on their vulnerability, as calculated by a climate vulnerability index. That is to say, are resource conflicts clustered in countries deemed vulnerable by a climate vulnerability index? As global climate change continues to alter human environments, it increases the likelihood of conflict. This project creates a vulnerability index based on adaptive capacity, sensitivity, and exposure indices. These indices were aggregated in GIS and then used to analyze whether or not conflicts are more likely to occur in more vulnerable states. The results show that while conflicts are clustered in highly vulnerable states, the incidence of conflict does not necessarily always correlate with the most vulnerable states.

Methodology:

The implementation of this project consisted of three distinct steps; the creation of the adaptive capacity, exposure, and sensitivity indices, the creation of the overall vulnerability index, and finally, the conflict cluster analysis. The indices were derived from three different types of data sources. The first type of data source was numerical data from excel sheets. The tables were then added to their respective layers in ArcMap and joined to the African country shapefile using country as a key. The second type of data type was rastar shapefiles. The rastars were first reclassified in map algebra to identify zones with suitable rastar pixels for the desired variable. This rastar was then exported to a new rastar layer and inputted into the Zonal Statistics as a Table tool and outputted as a table, which was subsequently joined to the African country shapefile. The final data type used was the water resources shapefile, which was in vector form with small polygons representing each aquifer. In order to get all of the water data at the country level, a dissolve was used. Once the data was dissolved at the country level, it could then be joined to the African country shapefile, containing the joins from the other data types. Once all of the variables were normalized and within the same attribute table in ArcMap, the field calculator was used to create a simple average of all the variables. The separate indices were then joined to one another in a new dataframe and averaged using field calculator to create the climate vulnerability index. The final step was to add the conflict layer to the maps and use the Local Moran's I test to illustrate where the clusters locations overlap with vulnerable states.

Climate Vulnerability Index with Conflict Clusters



Cartographer: Juliet Hewes

Developed for: UEP-232 Intro to GIS

Date Produced: 19 December 2016

Map Projection: GCS_WGS_1984

Data Sources: ArcGIS, HarvestChoice GIS Database, World Bank Data, World Resource Institute Aqueduct Database

Results and Conclusions

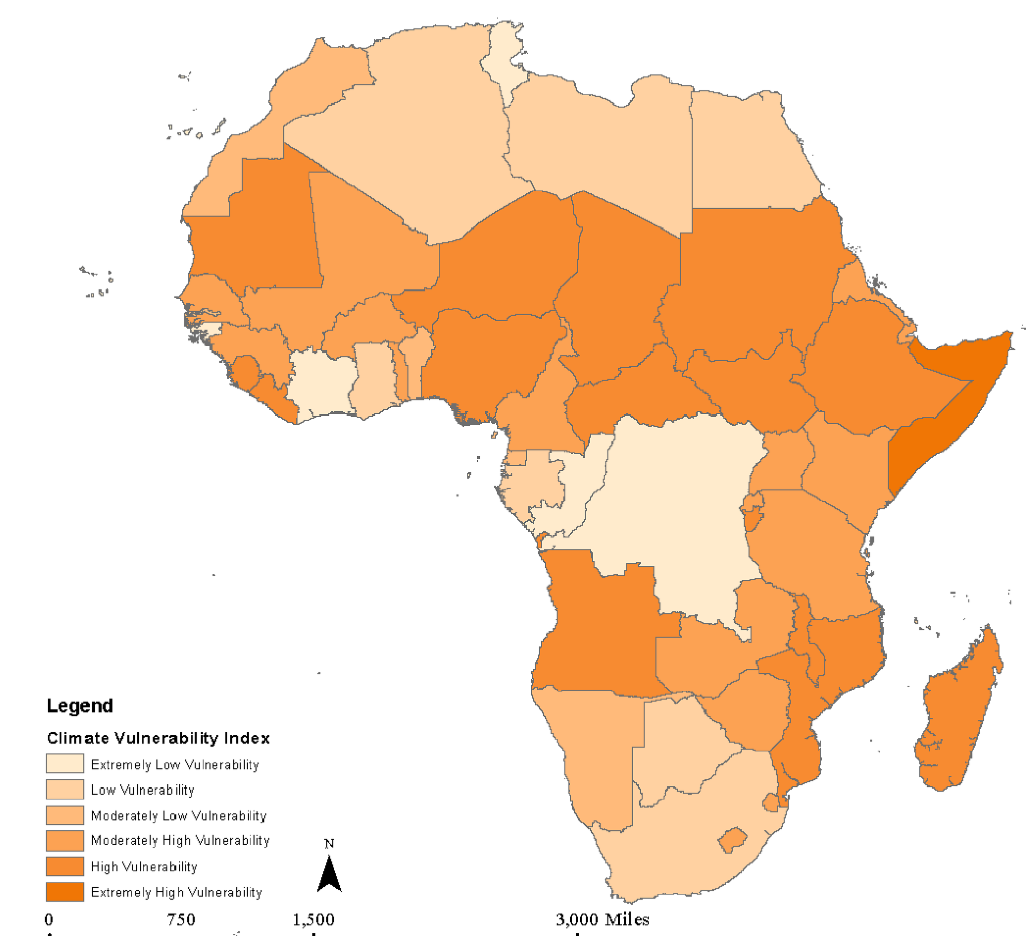
Analysis was carried out based on the results from the Local Moran's I test. The test was carried out on the overall climate vulnerability index, as well as on the indices for adaptive capacity, exposure, and sensitivity. Overall, all three of the maps showed that while conflicts occur in states that are either at high vulnerabilities or extremely high vulnerabilities, they do not necessarily always correlate with the most vulnerable states. For example, the DRC has outlier clusters of high fatality conflicts. However, it scores low on the CVI.

Before one can conclude any significant policy implications from this project, further study is required. For instance, it would be beneficial to break down the vulnerability indices into smaller, county-level polygons. Another important addition to this research would be determining the causal relationship between conflicts and vulnerabilities.

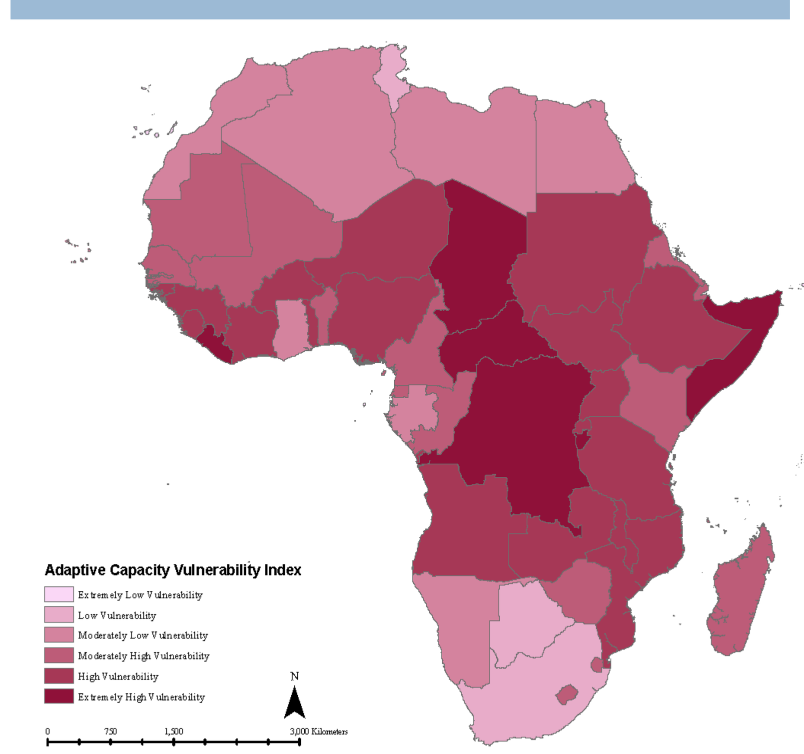
Sources of Spatial Error:

This project is likely to contain a few spatial errors that would affect the calculation of the CVI. Firstly, not all variables ended up being weighed equally because not all categories had the same amount of variables and secondly, spatial error may have occurred while joining the WRI water resource files to the African country shapefiles as the two were joined based on country name, which did not always match up, and therefore were manually altered.

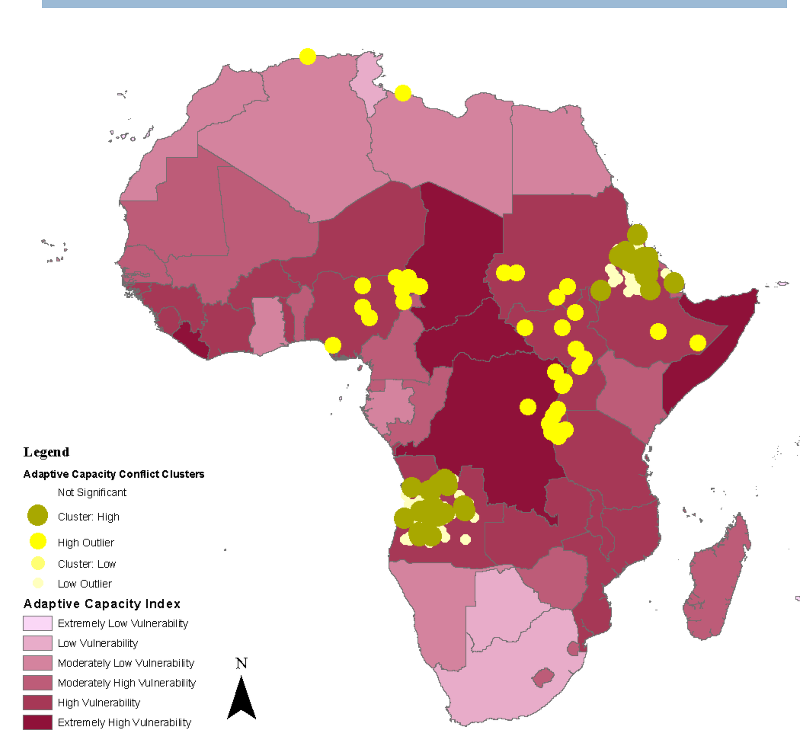
Climate Vulnerability Index



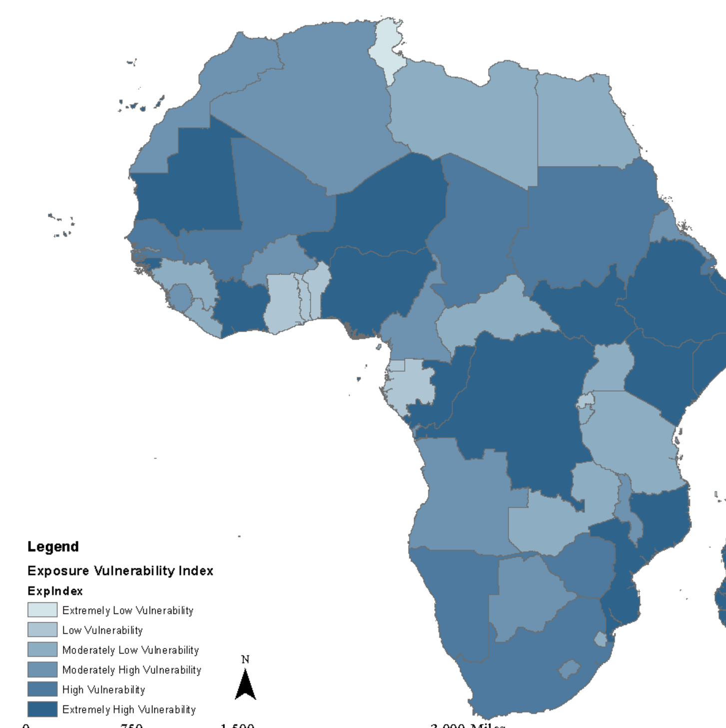
Adaptive Capacity Vulnerability Index



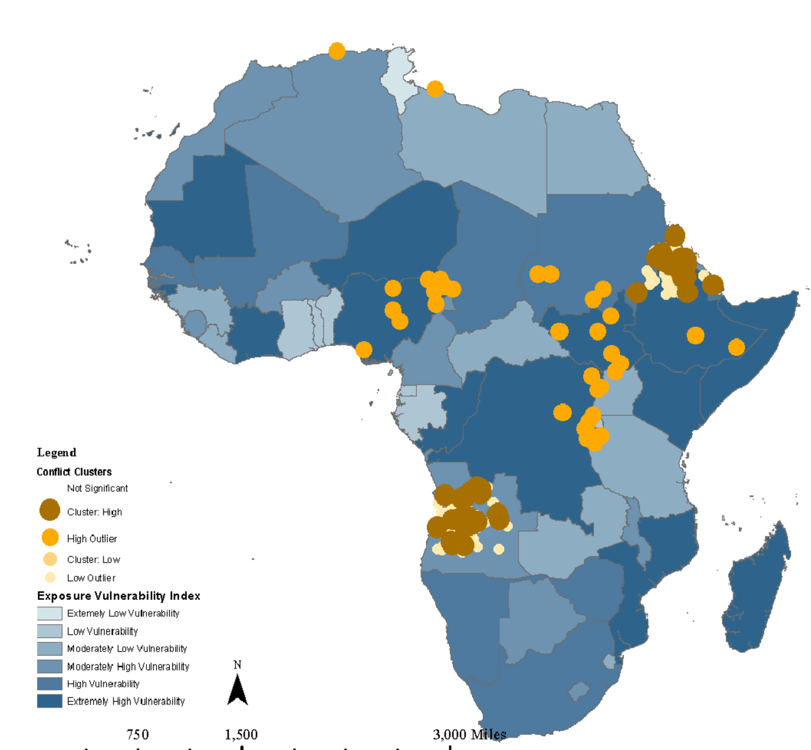
Adaptive Capacity VI with Clusters



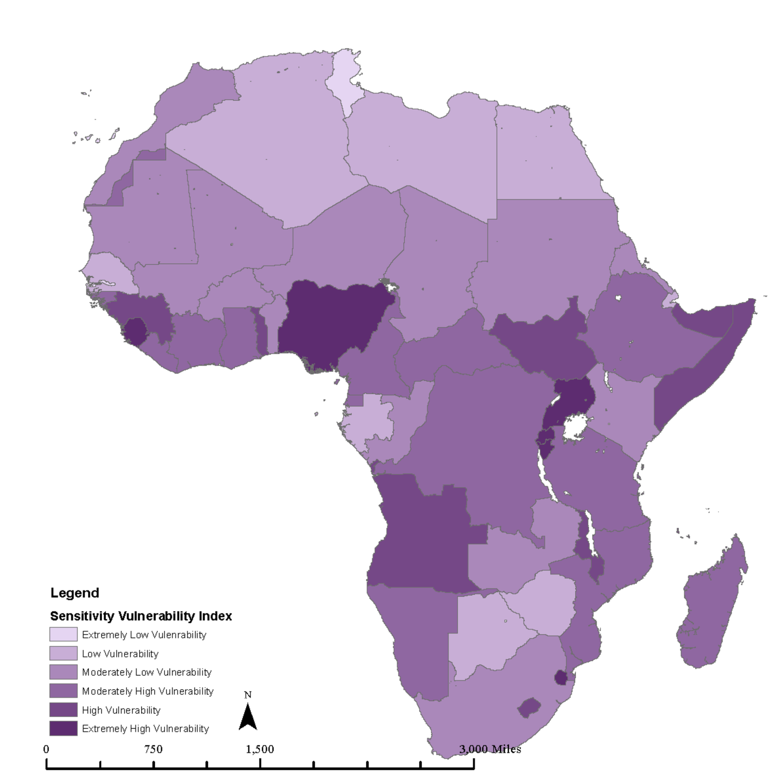
Exposure Vulnerability Index



Exposure VI with Clusters



Sensitivity Vulnerability Index



Sensitivity VI with Clusters