TEAM SPATIAL CLAN

I. Individual information for winner announcement

Please provide your preferred information for use in announcing the winners of the competition. If you are on a team, please copy this section as needed and complete it for each team member.

Team member 1

- Name: EILEEN MBURU
- Hometown: NAIROBI CITY
- A recent picture of yourself or digital avatar (feel free to attach separately) - Attached
- Social handle or URL (optional): https://www.linkedin.com/in/mburu-eileen/
- Who you are (mini-bio) and what you do professionally: With a background in Geographic Information Systems (GIS), my current focus lies in applying GIS methodologies to address climate change challenges, including mitigation, adaptation, and resilience efforts. I am enthusiastic about utilizing GIS and remote sensing technologies to support initiatives aligned with the United Nations Sustainable Development Goals (SDGs).

Team member 2

- Name: LINUS ANARI
- Hometown: KISII TOWN
- A recent picture of yourself or digital avatar (feel free to attach separately): - Attached
- Social handle or URL (optional): https://www.linkedin.com/in/linus-anari/
- Who you are (mini-bio) and what you do professionally: Geospatial engineering student at the University of Nairobi, passionate about leveraging spatial data for innovative solutions, with a focus on mapping, remote sensing, and geographic information systems (GIS). I aspire to contribute to sustainable development through the application of geospatial technology's insane potential!

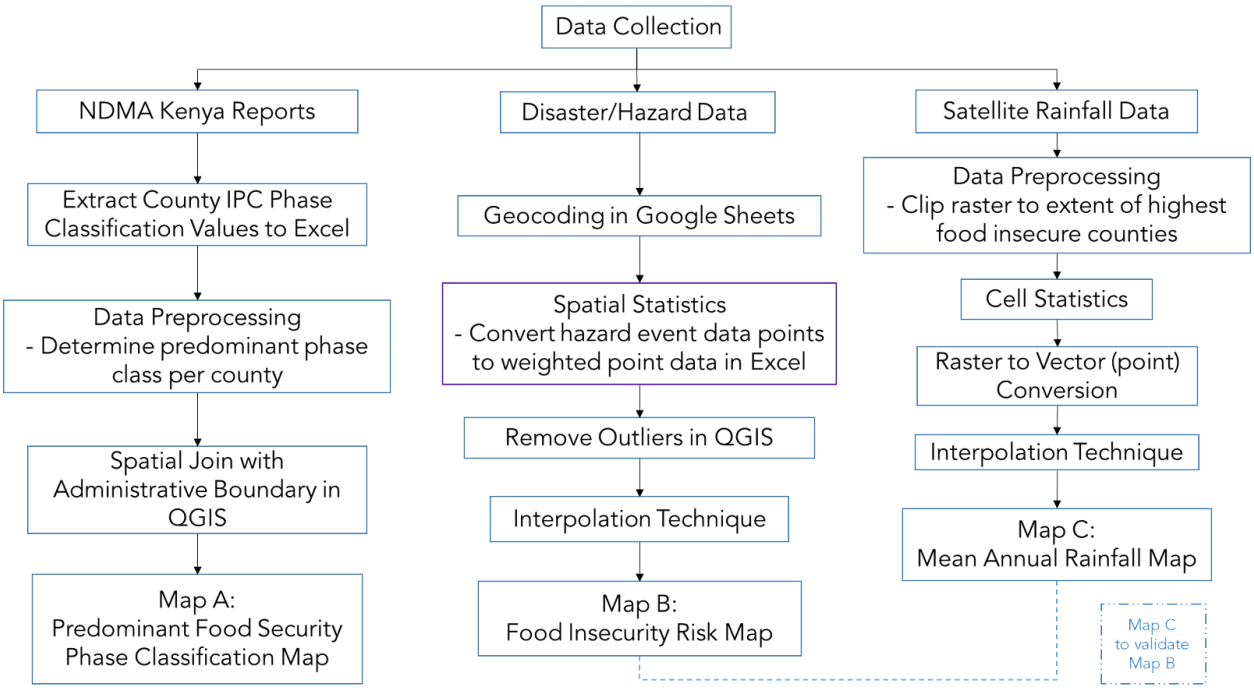
II. Team submission write-up

The below will provide useful additional context to both the challenge organizers and the broader DrivenData challenge community. Information included in this section may be shared publicly along with challenge results. You can respond to these questions in an e-mail or as an attached file. Please number your responses.

1. What motivated you to compete in this challenge?

   We've always been fascinated by the immense potential geospatial technology has to offer, and the idea of leveraging it in solving some of the world's biggest problems. The challenge sparked our excitement as it provided a unique opportunity to delve into the application of GIS techniques in addressing SDG 2: Zero Hunger, particularly in Kenya's most food-insecure areas. Recent extreme weather events, like the 2023 El Niño rains and an impending drought in Northern Kenya, underscored the critical need for focused interventions. This competition provided us with a platform to explore this critical issue, and we were eager to discover the feasibility of spatially disaggregating food security risk to inform intervention strategies aligned with achieving SDG 2: Zero Hunger.

2. High level summary of your approach: what did you do and why?



Food and nutrition security assessment reports in Kenya, conducted by the Kenya Food Security Steering Group and made publicly available by the National Drought Management Authority (NDMA), evaluate various factors within each county to determine its current food security phase classification. However, while these assessments consider multiple factors such as agricultural productivity and food market prices, they typically offer regional food security analyses and lack spatial disaggregation to pinpoint specific food insecure hotspot locations. Recognizing the need for such disaggregation even in the most food-insecure counties, we adopted the illustrated methodological approach to our analysis.

Disasters, known to jeopardize agricultural production and the livelihoods of millions reliant on agrifood systems, are seldom integrated into spatial analyses in food security assessments. We chose to incorporate disaster data to spatially disaggregate food security assessments in counties predominantly classified in Crisis stage 3, i.e., Turkana and Marsabit. We then validated these findings using satellite rainfall data, a crucial factor directly influencing food security.

This spatial disaggregation allows for a more targeted approach, providing directed guidance to the most vulnerable populations within the county. As there exists spatial variability within counties classified predominantly in IPC Stage 3, certain areas are bound to experience more severe challenges than others. Identifying these specific hotspot locations enables interventions to be tailored to address the most pressing needs of vulnerable populations within these counties.

3. Did you use any tools for visualization, data preparation, or exploratory data analysis that aren't listed in your submission?
   Yes.
   - We employed a script developed by Will Geary on Google Sheets to geocode the obtained disaster events from the Humanitarian Data Exchange (HDX).
   - We utilized PivotTables in Excel to tally the occurrences of disaster events per location before generating a disaster points shapefile in QGIS.

4. What are some other things you tried that didn't necessarily make it into the final workflow (quick overview)?
   After establishing a spatial correlation between areas with low rainfall and heightened food insecurity and vice versa from the generated risk map using disaster data, our initial plan was to incorporate additional datasets, such as rainfall and conflict data into our analysis, to create a more precise risk map. However, due to time constraints, we were unable to include this in our workflow but it's something we hope to explore in the future.

5. If you were to continue working on this problem for the next year, what methods or techniques might you try in order to build on your work so far?
   We would expand our current methodology of use of disasters (as validated by satellite rainfall data) by incorporating additional datasets related to known contributing factors of food insecurity. Building upon the foundational analysis of disaster data, our future work will integrate a more comprehensive understanding of the complex dynamics influencing food security hotspots. GIS Techniques to be considered for the risk assessment would include multicriteria decision analysis (MCDA) and the Analytic Hierarchy Process (AHP). Specifically, we would plan to incorporate datasets that align with the four components of food security: availability, access, utilization, and stability.

   a) Availability: We would explore datasets related to agricultural and livestock productivity, including factors such as crop yields, land use patterns, and the prevalence of pests and diseases.
   b) Access: We would incorporate datasets related to household income sources, infrastructure for water access and availability, market prices of essential food items, and transportation networks.

c) Utilization: Evaluating the utilization of food resources within the community.
d) Stability: Datasets related to environmental stability, including climate patterns, natural resource management, and the prevalence of conflict or displacement.

While we recognize that the availability of the listed spatial datasets at a micro level may be challenging, we would be committed to furthering this work to attain more precise food insecurity hotspots. This endeavor would be crucial for guiding interventions that align closely with **SDG 2: Zero Hunger**, ensuring that efforts made are targeted and impactful in combating food insecurity at its roots.

Moreover, in our ongoing efforts to address food insecurity and refine our risk assessment models, we recognize the immense value of incorporating a broader array of Earth observation datasets provided by NASA such as; **VIIRS**: *Providing insights into population density and potential economic activities*, **MODIS**: *Incorporating MODIS data to enhance our understanding of land surface temperature and other factors influencing agricultural productivity*, **GRACE-FO**: *Monitoring changes in water movement, especially in regions prone to drought, which can offer critical insights into groundwater depletion and potential impacts on agriculture*, among others.

6. Have any of your team members previously participated in a program funded by the U.S. government? If so, which program? NOT APPLICABLE