Evaporative Vegetable Cooler Suitability Analysis for Kenya

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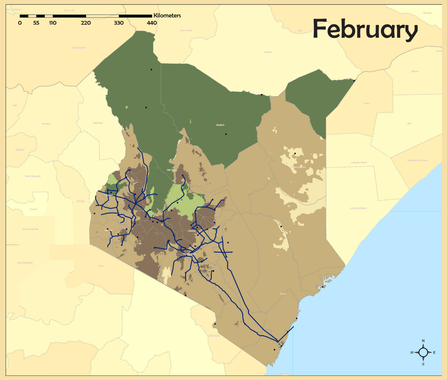
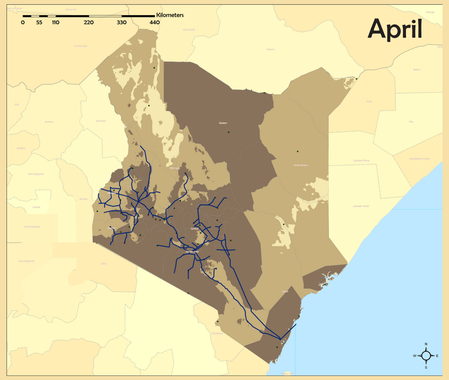
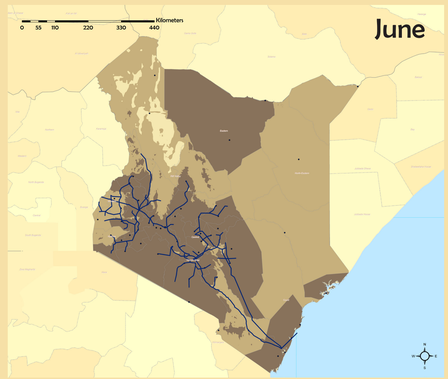
Introduction:

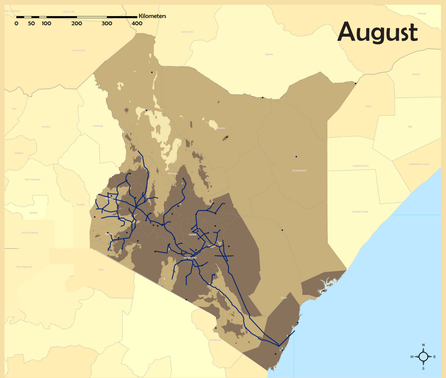
In Kenya today, agriculture is crucial in supporting human nutrition and economic prosperity for many. While prolific, the country's agriculture sector is hindered by a lack of affordable and effective post-harvest vegetable storage solutions. This often leads to vegetable spoilage, loss of income, reduced access to nutritious foods, and significant amounts of time spent traveling to purchase vegetables. In conjunction with the World Vegetable Center, D-Lab has developed Evaporative Vegetable Cooling Technologies which may provide a solution to this problem. In this mapping study, we aim to determine where these climate-dependent technologies will be viable in Kenya based upon humidity and temperature data.

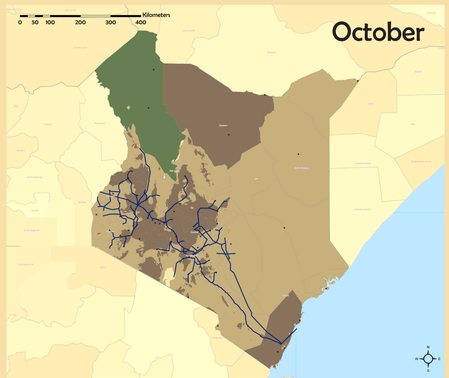
Bi-Monthly Suitability Maps

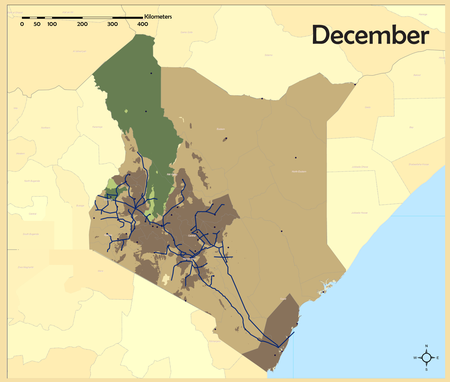




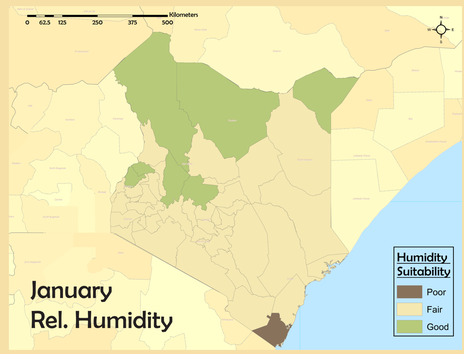


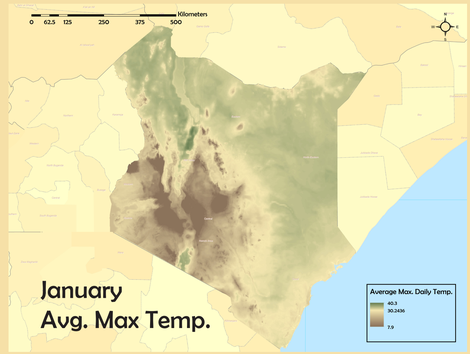






Methodology:



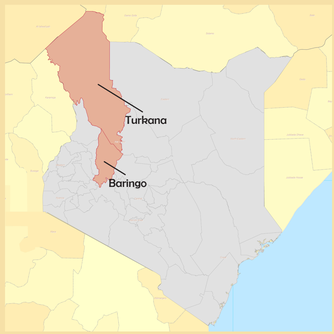


In order to determine where Evaporative Vegetable Cooling Technologies (EVC) might be suitable for use in Kenya, I used the matrix below which was derived through previous testing in Mali. It was determined that the ideal climatic condition for EVCs is hot and dry - the technologies function best when maximum daily temperature is above 35° C and relative humidity is less than 50%. As shown below, both temperature and humidity were also separated into classifications of poor, fair and good. In order to reflect this matrix in my maps, I collected national data on maximum daily temperature and relative humidity. From there, I classified both sets into the three ratings, and overlayed polygons representing humidity (above, left) and polygons converted from a reclassified raster (above, right). Finally, I used intersects to assign suitability scores.

	Temperature 25° C. >	Temperature 35° C. >/= 25° C.	Temperature > 35° C.
Rel. Humidity > 70%	Poor (1)	Poor (1)	Poor (1)
Rel. Humidity 70% >/= 50%	Poor (1)	Fair-Poor (2)	Fair (3)
Rel. Humidity 50% >	Good-Fair (4)	Good (5)	Good (5)

Results and Conclusions:

The purpose of this mapping project was to determine which regions of Kenya to target for distribution of Evaporative Vegetable Cooling technologies. With this in mind, the bi-monthyl suitability maps provide valuable information about where we should be looking. First of all, since regions on the electrical grid have access to refrigerators, the southern half of the country is likely not suitable for implementation of EVCs. Looking at the results from the climatic suitability analysis, it appears that Turkana county and Baringo county are the best targets. Both have a "Good" rating for more than half the year, and even during the humid season from April to August, neither is at any point classified as "Poor" which will allow for at least some viable use year-round.



Coordinate System: Arc_1960_UTM_Zone_37S
Projection: Transverse Mercator
Data Sources: ArcGIS, Tufts GIS, Eric Verploegen, MIT D-Lab, WorldClim, OpenStreetMap, World Bank Group
Cartographer: Brendan Ng (UEP-232)

Tufts UNIVERSITY

MIT D-Lab