Ecological factors associated with abundance and distribution of mosquito vectors of Rift Valley fever virus during an epidemic period in Isiolo, Kenya

Max Korir[1], Joel Lutomiah[2], Bernard Bett[1]

1.International Livestock Research Institute, P. O. Box 30709-00100, Nairobi

2.Kenya Medical Research Institute, P. O. Box 54840-00200, Nairobi

Introduction

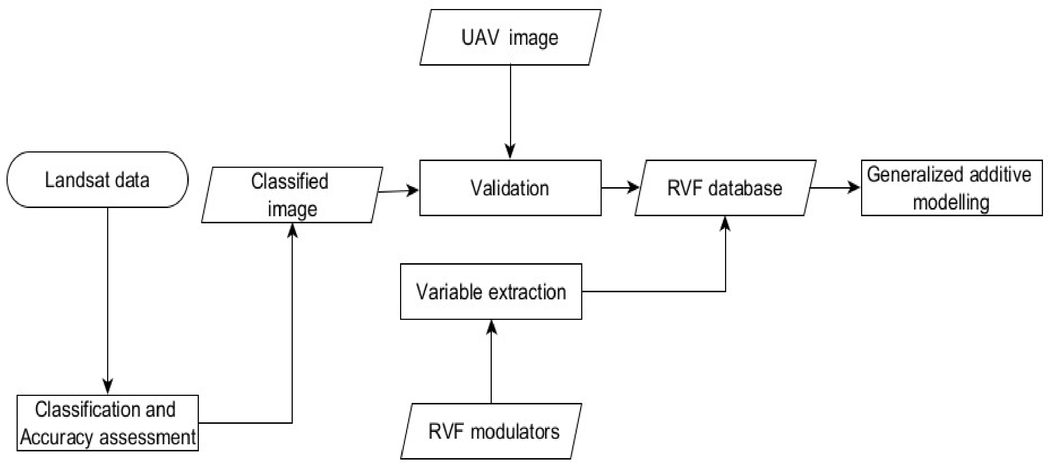
- Rift Valley fever (RVF) is a zoonotic disease caused by the Rift Valley fever virus (RVFV), impacting both animals and humans. The disease is prevalent in Sub-Saharan Africa and the Middle East, often emerging after periods of intense rainfall and subsequent flooding.
- These climatic conditions create a conducive environment for the transmission of the virus. RVF epidemics can have severe economic repercussions, particularly for rural communities that depend on livestock for their livelihoods. Mosquito vectors thrive in areas that have been flooded, facilitating the spread of RVFV among animals and humans.

Objective

- To identify the ecological factors that are associated with the abundance and distribution of mosquito vectors of Rift Valley fever virus during an epidemic period in Isiolo, Kenya.

Methods

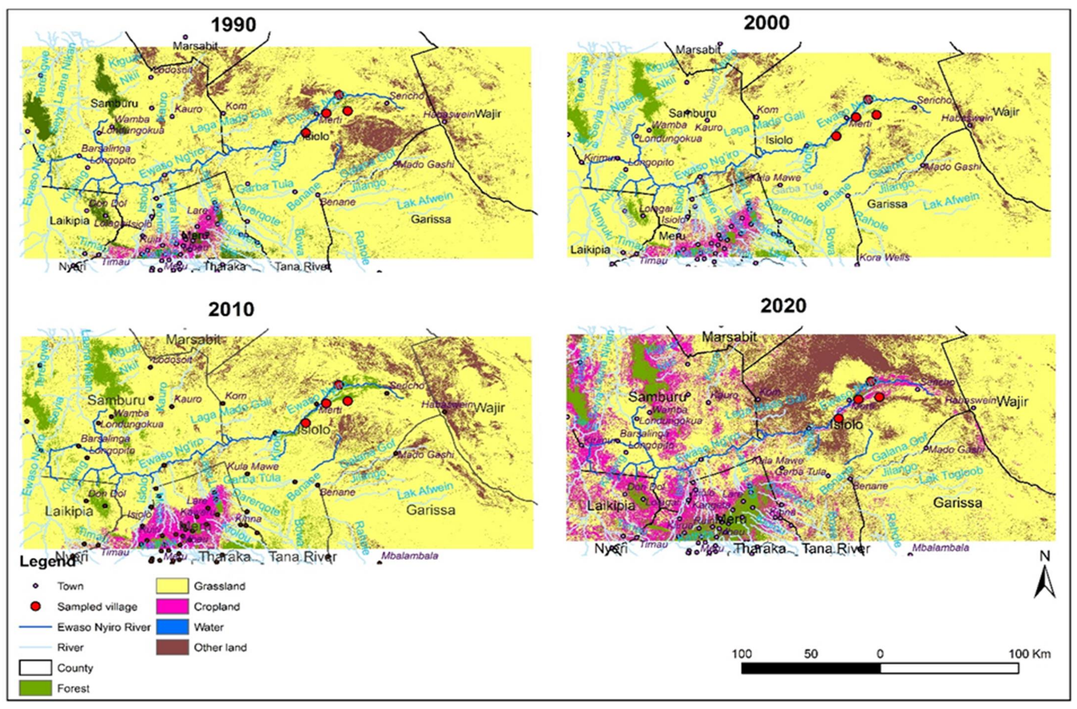
- Entomological survey during RVF outbreak in Isiolo, Kenya, in 2020-2021.
- Mosquitoes trapped using CDC light traps over 48 hours.



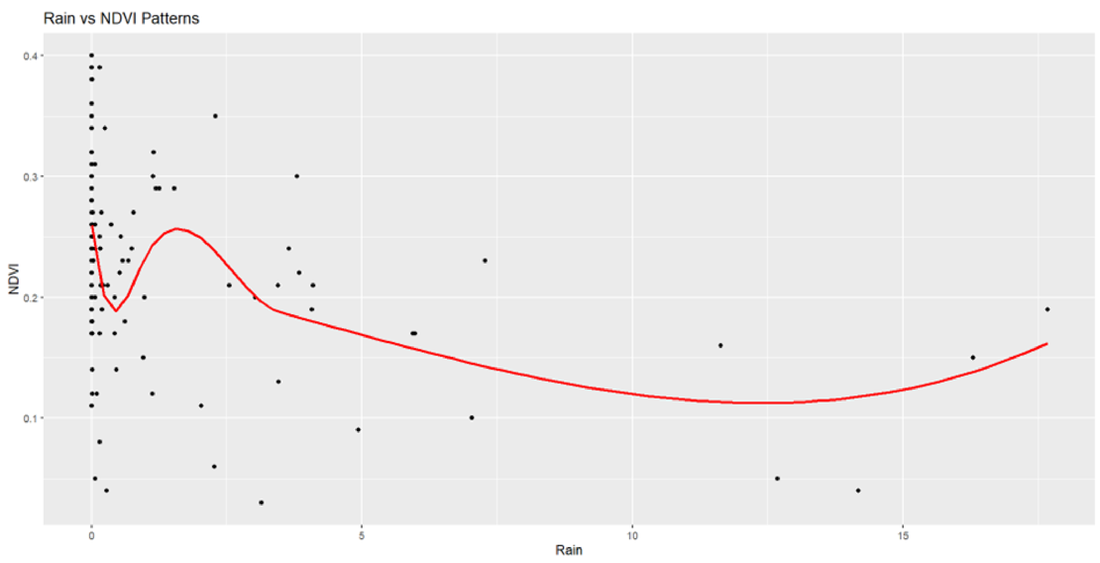
- Generalized Additive Model (GAM) used for analysis, considering factors like land cover, vegetation indices (NDVI), elevation, curvature, soil type, soil texture, slope, land surface temperature (LST), and modified normalized difference water index (MNDWI)

Results

- 5,307 mosquitoes of 22 species were trapped during the study.
- Significant factors influencing mosquito abundance: Standard deviation of NDVI, mean MNDWI, curvature, elevation, and land cover.



- Negative correlation between mean NDVI and rainfall quantity, suggesting floods trigger RVF more than rainfall.



Discussion

- Forest-to-cropland conversion observed over time, affecting mosquito habitats.
- The analysis showed the possible cause of RVF being floods rather than rainfall. The model developed would be useful for predicting the spatial distribution of potential RVFV vector breeding sites in the region

Conclusion

- Geospatial and machine learning technologies are valuable for predicting RVF heterogeneity.
- Understanding ecological factors aids in predicting and managing RVF outbreaks.
- Study contributes to the development of effective early warning and mitigation strategies.

Max Korir
International Livestock Research Institute
m.korir@cgiar.org ● Box 30709 Nairobi Kenya