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# A Multi-Ecosystem Analysis of the Links Between Land-Use Change, Mosquito Communities, and Virus Abundance

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The emergence of mosquito-borne viruses is linked to land-use change and biodiversity loss, yet the ecological mechanisms driving these interactions remain poorly understood. This study aimed to identify common drivers for mosquito-borne virus emergence by studying the impact of land-use change on mosquito and virus community dynamics across lowland and montane rainforests and savannah.

A total of 32,632 mosquitoes, representing 130 species of 13 genera, were collected in disturbed and undisturbed sites. Mosquito species richness was significantly higher at undisturbed sites, with turnover rather than nestedness driving community differences across ecosystems. In total, we detected 665 viral sequences from 150 species, including 127 putative previously unknown viruses. Virus richness was higher at all undisturbed sites with more complex host-virus networks suggesting that land-use change homogenises mosquito-virus interactions, potentially altering transmission dynamics. Temperature was a key driver for mosquito abundance and diversity. Mosquito diversity correlated with virus diversity across ecosystems.

These findings highlight the role of vector communities in shaping viral communities. By using a multi-vector, multi-pathogen approach and integrating ecosystem-wide comparisons, this study advances our understanding of how anthropogenic disturbance influences vector-virus interactions and viral spread, with implications for public health and biodiversity conservation.

## Keywords

mosquito-borne viruses, land-use change, biodiversity loss, disease ecology, viral emergence, Uganda

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## Professional Status of the Speaker

PhD Student

## Junior Scientist Status

Yes, I am a Junior Scientist.

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