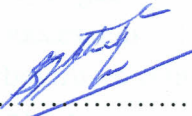



**Seasonal variation of mosquitoes species (Culicidae), abundance and potential risks to arboviruses in three ecological systems of Marigat District, Baringo County.**

**Kamau Samuel Kabochi (MSc)**

**I84/22567/2012**

Signature.......... Date..........

Department of Zoological Sciences

A research proposal submitted in fulfilment of the requirement for the award of the degree of Doctor of Philosophy, Applied Entomology, in the School of Pure and Applied Sciences of **Kenyatta University**

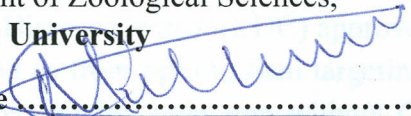
**Supervisors**

**Professor John M. Mueke**  
Department of Zoological Sciences,  
**Kenyatta University**

Signature..........

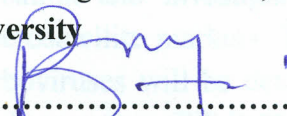
Date..........

**Dr Michael M. Gicheru**  
Department of Zoological Sciences,  
**Kenyatta University**

Signature..........

Date..........

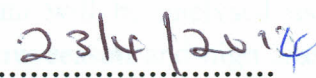
**Dr Benson M. Mwangi**  
Department of Zoological Sciences,  
**Kenyatta University**

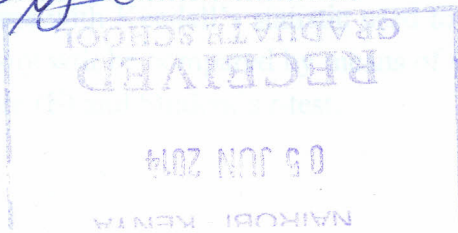
Signature..........

Date..........

**Dr. George N. Michuki**  
Molecular Pathogen Discovery Laboratory  
**International Livestock Research Institute (ILRI)**

Signature..........

Date..........



## Abstract

Livestock and man can be infected with mosquito-borne arboviruses that may result in death. The abundance and vectorial capacity of the mosquito as a vector is dependent on environmental changes such as heavy rains and seasonal flooding that occur in an ecosystem resulting in succession of diverse species and eventual disease epidemics. Some of devastating arboviruses transmitted by mosquitoes are Rift Valley Fever (RVF), West Nile and Chikungunya viruses among others. In Kenya outbreaks of RVF have occurred after every ten years coinciding with the El-Nino rains with most recent one occurring in 2006/2007 and Yellow Fever during the 1997/1998 El-Nino rains. It is reported that the culpable RVF mosquito vector, *Aedes* species emerges during the heavy unusual prolonged rain fed floods. The water of Lake Baringo has been swelling over the past one year submerging the shoreline. Geological experts are attributing the rise in water levels and resultant flooding to a rare geological movement of tectonic plates. Unlike the rain fed floods, it is not understood what changes would occur in mosquito composition and infections in such a shoreline ecosystem as that of Lake Baringo currently experiencing such prolonged floods from a swelling waters of the lake. This study aims at establishing changes that would probably occur in vector abundance, species diversity, and infections in the vector, risks and the reservoir to arboviruses in Lake Baringo basin under such circumstances. The current study will be undertaken in three existing ecological systems found in Marigat District:- flooded shoreline of Lake Baringo; riverine swampy wetland; and dry-land ecosystems. The trapping will be carried out in the grazing areas during the day using carbon dioxide baited Centre of Disease Control (CDC) approved light traps as from 3pm to 6pm targeting daytime feeders and as from 6pm to 6am targeting night time feeders. In each of the three identified homesteads, another light trap without CO<sub>2</sub> will be placed within the animal shed as from 6pm to 6am to trap night feeders. Therefore a total of 24 traps will be used. Trapped mosquitoes will be identified to genus level in the field, sorted into pools of 50 and then transported to International Livestock Research Laboratory Institute (ILRI), Kenya, for further identification and investigations on the genetic diversity using Intergenetic Site System and microsatellite markers. The infection in mosquitoes (Minimum Infection Rates (MIR)) with arboviruses will be determined from homogenized pools by reverse transcript polymerase chain reaction (RT-PCR). Cattle, goats, sheep and chicken will be bled using Ethylene diaminetetra acetic acid (EDTA) coated vacutainer tubes and then aliquotted. Polymerase Chain Reaction (PCR) will be used to determine the Immunoglobulin M (IgM) and Immunoglobulin G (IgG) antibodies to arboviruses. Blood meal analysis will be carried out from the engorged fed trapped mosquitoes to determine reservoir host using Enzyme Linked Immunosorbent Assay (ELISA) and PCR methods. Data will be analysed using Analysis of Variance (ANOVA) to detect differences between low season and high season mosquito numbers with Kendall's statistic used to obtain an index of community similarity. Mosquito diversity will be compared by means of the Shannon diversity index (H'), Shannon evenness measure (E) and Student's *t*-test.