

## LAKE MAGADI ECOSYSTEM: CURRENT RESEARCH TRENDS AND FUTURE PERSPECTIVES.

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At the southern-most point of the Kenyan Rift Valley lies an alkaline and highly saline soda lake, Lake Magadi, often surrounded by the pastoral-nomadic Maasai community. Approximately 80% of this lake is covered largely by trona while the remaining portion comprises small pockets of lagoons located at the periphery, actively recharged by hot geothermal springs. The waters in these lagoons present a high pH close to 10, extremely high water temperature (close to 45°C) and an extremely unique chemical profile. The atmospheric temperature and UV solar radiations recorded so far are high. As a consequence, this lake has been postulated as one of the most hostile aquatic environments for survival of any fish, and by extension, other aquatic organisms. Interestingly, there is a small cichlid fish, Lake Magadi tilapia (*Alcolapia grahami*) which thrives in this lake. So far, this fish is the only vertebrate species inhabiting this lake. Consequently, a team of scientists in the recent past has been consistently seeking for answers about this fish's ability to tolerate such harsh and arguably bizarre environmental conditions. As a result, a number of adaptive features (physiological, morphological and behavioral) behind the survival of this fish in the lake have been elucidated and published in reputable journals. The most important and equally unique feature among all is the ability of this fish to excrete only urea as its sole nitrogenous waste instead of ammonia frequently witnessed in other fish. Indeed, excretion of ammonia into the highly buffered alkaline water would appear to be impossible, hence, making *A. grahami* the only 100% ureotelic teleost fish.

Only recently was the discovery of the larvae of a chironomid, an invertebrate species of the non-biting midges to also inhabit this lake. The analysis of its adaptive features is currently underway.

Some studies on microbial diversity in the lake have been done; it has been reported that a variety of bacteria as well as a number of OTUs (operational transcribed units) related to the marine *Crenarchaeota* predominate its biofilm.

Presently, a group of Geologists are drilling a core near the Lake Magadi area to gather detailed climatic data on past climates. It is postulated that the information found will be useful in understanding how anthropogenic climate affects earth's ecosystem and species including its effects on infectious diseases and food security.

Additionally, Lake Magadi area is inhabited by numerous species of birds, with flamingoes comprising the largest group.

The primary objective of this research review is to bring into perspective the limited work done so far in this ecosystem, and hence, the glaring research gaps that exist. Owing to the uniqueness of this ecosystem, it is hoped that this review will stimulate further research interests on the many areas that are yet to be fully exploited, for example, genetics and evolutionary studies, microbiology, hydrobiology, conservation biology, inter-relationship of the different organisms in this ecosystem and their impact on humans and animals.