

*Full Length Research Paper*

# Consumption, indigenous knowledge and cultural values of the lakefly species within the Lake Victoria region

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Of the edible insects, lakeflies (*Chaoborus* and *Chironomus* sp) are least documented as items of human consumption. They are eaten by the Luo communities living within the Lake Victoria basin. The purpose of this study was to evaluate the importance of lake flies as a source of food and its role in cultural practices. Edible Diptera species were identified, indigenous knowledge documented, and its cultural value analyzed. Data was collected in Nyanza Province within the Lake Victoria region in Kenya. The most commonly consumed type are *Chaoborus* sp. and *Chironomus* sp. Emergence of the flies is used to predict rainfall, and the size of swarms to predict the amount of rain, and the villagers prepare accordingly for cropping. Women feed their weak children with the Chaoborids biscuits to gain strength. Witchdoctors claim to use flies as lucky charms in business and romance. Some traditional medicine practitioners also add the fly powder to their concoctions to cure certain ailments. They claim that adding a portion of the fly to herbal medicine enhances efficacy. Major challenge in utilization of insects is their seasonality and difficulties in collection. The flies have economic potential for the natives of clean lake waters region.

**Key words:** Lakeflies, entomophagy, indigenous knowledge, cultural values, Lake Victoria.

## INTRODUCTION

Utilization of insects as food for human and livestock and for medicinal value is not uncommon among the natives of the Lake Victoria region. Certain insects are held in high esteem solely for witchcraft and medicinal values. Others are collected for their nutrition value to feed either humans, poultry or fish. The villagers in the lake region have used edible insects for centuries. However, due to change in eating habits and preferences, the practice is changing fast. Several researchers have documented consumption of insects in other regions and documented challenges faced by entomophagy. Well documented edible insects include termites, locusts, crickets, bees, grasshoppers, and certain groups of caterpillars and worms (Banjo et al., 2006; van Huis, 2003, 2002; Gullan and Cranston, 1999; Ferreira, 1995; Chen et al., 1998). However, not many researchers talk about lake flies as edible.

Of the insects consumed within the lake region, those

belonging to the order Diptera are probably least documented because they are so numerous yet only a few are collected for human consumption. Edible species of Diptera are eaten by almost all the Luo communities living along the Lake Victoria basin in Nyanza Province - Kenya. The villagers who collect the flies along the lake region refer to it as a secretive, but a tasty insect. The Luo community who live along the Lake Victoria region appreciate the fly as a special edible insect with several economic and cultural values. Chaoborids are familiar insects to people such as fishermen and women who spend most of their time near or on the lakes fishing and processing their catch. During our data collection, we noted that communities living near waters such as streams and river within the lake region no longer witness any swarming of the flies. According to researchers, this may be attributed to water contamination that has interfered with some macroinvertebrates and other aquatic life (Muli and Mavuti, 2001; Mitema and Gitau, 1990; Meyer, 2005). Current observed emergences of the flies on the Lake Victoria seem to be confined only on certain areas on the lake indicating the continuing human destruction

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of the lake biodiversity.

This study examined consumption, cultural values attached to the insects. The purpose of the study is to increase appreciation of the flies and its habitat; as a source of food nutrients; its role in traditional medicine and other cultural practices in which the insect play a role. The rationale is that the flies have a potential in income generation for poverty alleviation within the lake region. Increased appreciation of this insect would contribute to conserve the threatened biodiversity of the lake region.

Several research questions were formulated to guide this study. These included the species, traditional uses, harvesting, processing and storage, beliefs, practices, folktales, taboos or myths associated with the flies, challenges villagers face to utilize the insects, and the prospect of the future of consumption.

### Consumption of insects (Entomophagy)

Insects provide an excellent source of protein (Vane-Wright, 1991; Gullan and Cranston, 1999; van Huis, 2003; Pemberton and Yamasaki, 1995; Chen et al., 1998). Banjo et al., records that insects have played an important role in the history of human nutrition in Africa by publishing a nutrients analysis of 14 species of edible insects in Southern Nigeria. Ayieko (2007) also reports that insects can be part of food security in Africa because they contain essential food nutrients such as protein, iron, calcium, riboflavin and zinc which are among the nutrients which are often lacking in the diet of the poor in Africa.

Western civilizations think that eating insects is a result of starvation, thus a survival tactic for barbarians in Africa (van Huis, 2003). Chen et al. (1998) observe that even entomologists who agree that insects are delicious are reluctant to eat them. Several food values have been identified to support consumption of insects not only in poor nations but among the rich and developed nations as well. Gullan and Cranston (1999) reported that insects are high in protein, energy and various vitamins and minerals. They form 5 - 10% of the protein consumed by certain communities in Africa. Van Huis (2003) also records that insects contain a high amount of crude protein worth exploring for human feeding and Okedi (1992) suggests use of lake flies for poultry and aquaculture due to their low fat content.

### Economic importance

The use of edible insects may have enormous economic potential considering that they form the largest volume of animal protein consumed by all carnivores in the terrestrial ecosystems (Chen et al., 1998). Other than for their nutritional value, insects have been used in food flavoring and color, and as cooking oil. Van Huis (2003) mention the use of insect oil for dermatological purposes in horses

and sheep rearing. Insects are used in prevention and cure of different ailments; managing physical conditions such pregnancy including improving libido (van Huis, 2002). Fresh ants, which have rich formic acid content, are used in making salad dressing as substitute to acetic acid in vinegar (Chen et al., 1998). These authors also record that many pregnant women in Thai believe that consuming ants (*Oecophylla*) is good for their babies.

### Seasonality and collection

Although Gullan and Cranston (1999) say that insects are the major component of biodiversity and therefore people should try to understand them better, consumers will have quite a challenge to deal with. In Africa, edible insects are plenty during the onset of rains. Caterpillars are harvested from forest trees that form new leaves at the beginning of the rainy season (van Huis, 2003). Some specie of reproductive termites only emerges secretively at night, other such as the edible species of hymenoptera are only seen once in a year.

Light traps are the most commonly used methods to catch edible insects in Africa (Vane-Wright, 1991; van Huis, 2003). This is particularly so for insects which have a preference to swarm at night. When additional information about these edible insects becomes available, we shall hopefully be able to rear them in our farms.

### Culture and religion in entomophagy

In Thailand, entomophagy has a long cultural history, particularly for the poor. However, this has now become a lucrative business venture that has opened export opportunities and no longer a food for the poor alone (Chen et al., 1998). The authors also record that many pregnant women believe that consuming ants (*Oecophylla* spp.) is good for their babies. Berenbaum (1993) also record that Chinese athletes reported that super performance of couple of their team-mates in 1993 was due to consumption of a health tonic made from a caterpillar fungus. Van Huis (2003) also says that certain clans in Africa do not eat certain insects because the insects are sacred and used in fetishes, other insects are family or community totems. For example, termites that are widely eaten in Africa are restricted among members of the termite clans in Malawi, Tanzania, Mozambique, Zambia and Zimbabwe. The Yoruba tribe in Nigeria (the blacksmiths) does not eat crickets because "*Ogun*" the iron god does not accept animals that have no blood.

## MATERIALS AND METHODS

### Project sites and sampling

Data for this project was collected in Suba and Bondo districts of Nyanza Province within the Lake Victoria region in Kenya. Purposive sampling method with an assistance of a village guide was used to identify communities which are popularly known for lake

flies collection. The flies are available only along the lake region due to their inability to fly far inland after they emerge from the lake.

#### Data collection

Ethnographic methodology included field visits for familiarization and relating (making friends) to the respondents within the communities. The informants comprised the middle age and the elderly persons, and the younger generations who no longer value edible insects. By virtue of being members of the community within the lake basin, we used personal observation methods and non-structured interviews with relevant authorities in the villages. Such contacts enabled us to access knowledgeable villagers within and without the villages for information.

All information collected from individuals was counter-verified for authenticity at different subsequent venues. Information that was not verified true to the community by more than two other informants was rejected as too person-specific for scientific analysis.

About 50 persons in total were interacted with within a period of three months. The respondents were met in groups or as individuals for collection and verification of information. Samples of the insects were collected and classified.

## RESULT, ANALYSIS AND DISCUSSIONS

### Lake fly identification

The lake flies normally patch on specific shrubs or hills near the lakeshore commonly known in Luo as *kitambo* (a small hill or a raised ground with shrubs near the lake shore). In certain villages, such hills are protected shrines for collection of the flies. Some villagers revere the sites as sacred land.

The insects are called *sam* by the villagers who live along the lake region in Kenyan. According to the villagers, there are several types of edible *sam*. However, only three are commonly utilized in the area. Further interviews with the village revealed that only the Chaoboridae and Charonomidae are collected for human consumption. The most preferred chaoborid is *Chaoborus* sp., known in Luo language as *Otar* or *Rachar*. *Chironomus* sp.; known as *mang'a* or *oteng'* is collected in other areas. It was observed that different villages had different names for the same species. The several names given to this insect suggests the significance given to the insect by the communities that collect them. In Luo the word *oteng'* means blackish. The edible Diptera groups are commonly referred to in the community by the color of their bodies. Their demand and use varies with the color of the *sam*.

The villagers reported that they prefer the *Otar* for several reasons: Being small and relatively finer in texture than the others, it is easy to mash and mold into patties, the shapes into which mayfly meals are traditionally prepared and stored. It is also preferred because of its distinctive aroma.

Collection of the *Otar* is becoming rare because the designated collection sites (*kitambo*) along the lake shores are rapidly being cleared away for crop production. Studies indicate that there has been a reduction in

count from Oligochaeta and Insecta to Oligochaeta and Mollusca in Lake Victoria due to industrial effluent (Muli and Mavuti, 2001). Researchers also report that certain insects such as mayflies are ecological indicators of good water quality (Muli and Mavuti, 2001; Meyer, 2005). The insects may be emigrating from these sites due to lake contamination. Such activities are likely to hinder future utilization of the lake flies. When the insects migrate to another site, the alternative sites may not necessarily be accessible to the collectors.

### Traditional medicine and witchcraft

Traditional healers and witchcrafts tend to use rare species of animal and plant parts. Being rare and secretive in habitat, lake flies are valued among certain traditional healers and in witchcraft in Nyanza province. Most of the community members interviewed during the data collection did not know where and how the flies come about. Although Islands such as the Mageta and Fang'ano in Bondo and Suba districts respectively are known for consumption of the flies, most villagers are ignorant of the life style of the insects. Some villagers commented that '*...these insects are so secretive and mysterious. Nobody knows where they come from, neither where they breed. You cannot get them when you need them. They have their own schedule and you only see them when they have arrived*'.

Because of this secretive nature of the insects, there are beliefs, myths and folksongs associated with the insects. For example, witchdoctors use the *Chironomus* sp to promote good luck (lucky charm) in business. In romance, women and men who cannot attract mates are prescribed the lake fly charm. Traditional medicine practitioners also add *Chironomus* sp powder to their concoctions in witchcraft to cure certain diseases. They claim that adding a portion of the insect to herbal medicine enhances efficacy.

Several women claimed that lake fly meal is good for children who are ailing and weak. This was attributed to the availability of essential food nutrients such as protein and minerals in mayflies. A preliminary nutrition analysis indicates a sizable amount of zinc (about 83.1 ppm) available in mayflies. Zinc has been shown to be essential in fighting off certain diseases ([www.izincg.uddavis.edu/](http://www.izincg.uddavis.edu/)).

The Chaoborids attract a lot of black garden ants when kept in store. This was confirmed with several experiments in the laboratory. This unique feature of mayflies attracts the attention of the traditional healers who use the insects to treat ailments and attract good luck for their clients.

Witchcraft is practiced mainly in the underground domain. It is therefore not easy to study, understand or to authenticate information and purported effectiveness. Because of this limitation, we were unable to verify most of the information collected from such quarters.

The *Legion Maria* religious sect in Kenya claims that the lake flies are too mystic. Similar to the Yoruba tribe in Nigeria (van Huis, 2003), this sect also believes that insects should not be eaten because they do not have blood. They thus believe that consuming the flies, is inviting bad spirits into the family. One priest of the sect observed that the medicinal value of the Chaoborids is true but it may be used only when there are no alternative herbal or western medicines.

### Other economic uses

The villagers use swarming of lake flies to predict the onset of the raining season. At the beginning of the rain, the size of the swarm predicts the amount of rains expected. Large swarms tend to precede heavy rains. The villagers therefore use the information to prepare for cropping accordingly.

Lake flies also play a significant role in the lives of fishermen and women. When the insects swarm, the fish catch, particularly *Haplochromines* collection tends to be larger than other everyday catch. Schools of fish in the lake normally sense when lake flies swarm. They thus swim beneath the lake fly's swarms and feed on the insects as some of the insects fall on water. As such, the insects act as bait for the fishermen. Interestingly, the villagers observed that the insects are not only a source of food nutrients for human, but also play a significant factor in fishing - an important livelihood activities among the lake communities.

### Challenges on utilization of lake flies

The major challenge in utilization of insects as food remains to be their seasonality and inadequate information about swarming time. Like most of the edible insects within the lake region, Chaoborids tend to be fairly seasonal. Several authors suggest that Chaoborids' emergence depend on lunar periodicity (Macdonald, 1956; Corbet, 1958; Okedi, 1992; Mnaya and Wolanski, 2002). Such unexpected emergences just add to the mystic nature of the flies in the villages. Precise forecasting signs for swarming are not yet clear for the villagers. The villagers commented that they simply wait for insects to come out at their own time when the season is right. Couple of villagers mentioned about lunar activities, but they were not certain.

The lake flies are collected using traditional harvesters. The harvester is a woven basket which is tied to one end of a three-meter long stick. By holding the other end of the stick, the basket is whirled in the air when the insects come to shore during emergence. After patching, the villagers shake the shrubs and tree braches to disturb the insects then they are collected. By whirling the basket, the insects are trapped in the basket by scooping them off the air. The collection is then emptied into containers. To reduce spoilage, the insects are immersed in boiling

water, drained and then sun dried for preservation and storage. These harvesters are weighty. It requires a lot of energy, particularly for women, to hold and swing in the air. The unimproved village technology tends to be inefficient. They limit the amount of insects that can be collected before the insects perish in the bush uncollected.

### Conclusion and Recommendations

Although the use of edible insects has been trivialized in food security, they can play a major role in food security, health and environment management of the lake region. As discussed above, the Chaoborids have unexplored potential in human and livestock feeding. Their low fat content and high protein content specifically make them ideal for feed.

Several of the traditional practices mentioned above have some scientific reasoning background yet to be explored further. May be there are several other potential edible insects waiting to be identified and collected for more research analysis.

A lot of work has been done in studying lake flies in regions such as the North America, Europe and Australia. This current study shows that lake flies may have several other economic values yet to be explored. For example, mayfly in particular, is ecological indicator of the lake water pollution. The role of other lake flies is worth further analysis. Harvesting the insects to feed hundreds of malnourished children in Africa could be part of the solution to childcare problems in Sub-Saharan region.

Destruction of the lake biodiversity means reduced swarming of lake flies and other aquatic creatures that depend on the flies. For example, the lake flies such as the chaoborids and chironomids have been shown to support the feeding habits of snout fish in the Lake Victoria (Macdonald, 1956). Promoting the habitat of the flies for rapid multiplication includes protecting threatened fish species of the Lake Victoria waters.

The increased silting of the lake and introduction of other environmental hazards is denying the villagers this unique utilization of the insects. Expanded environmental management of the lake region will encourage the villagers to learn to conserve the natural environment that supports the insects.

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