

# Effect of Human-Wildlife Conflict on Food Security among Small-Scale Maize Farmers in Laikipia County, Kenya

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**Abstract:** Agriculture contributes to 30% of the global Gross Domestic Product and employs more than 2 billion people in the world. In Kenya, the agriculture sector contributes 26% of total GDP, 18% formal employment, 65% of total exports, 70% informal employment, is a source of employment food and income. However, the agriculture sector is affected by human-wildlife conflict. Although wildlife contributes significantly to national economic development, there exists human-wildlife conflict especially in unprotected wildlife habitats. Human-wildlife conflict can significantly contribute to food insecurity. However, information on its effect on food security among small-scale maize farmers in Laikipia County is inadequate and poorly documented. This study sought to establish how human-wildlife conflict affects food security among small-scale maize farmers. Document review and analysis was used in undertaking this study. A document review guide was used to collect data. It was established that human-wildlife conflict causes severe crop damage and livestock injury or even death. Although farmers use various mitigation strategies most of them traditional in nature, significant crop damage is being experienced. It was therefore concluded that human-wildlife conflict could be significantly affecting food security among small-scale maize farmers in Laikipia County. A study should be undertaken to determine the effectiveness of mitigation strategies used by small-scale farmers. Further, a study should be done to establish the influence of agricultural extension mitigation strategies on human-wildlife conflict. The information generated could be used by policy makers and agricultural extension service providers to plan better on how to mitigate the effect of human-wildlife conflict.

**Keywords:** Effect, Food Security; Human-wildlife Conflict, Small-scale Maize Farmer

## 1. Introduction

Agriculture employs more than 2 billion people in the world and contributes 30% of the global Gross Domestic Product, GDP (Hanson, 2013). In Africa, agriculture sector is vital in achieving food security, employment creation and economic growth (Alliance for a Green Revolution in Africa, AGRA, 2013; Hoffman, 2012). The sector provides income and employment for Africans especially the poor (Ncube et al., 2012). Agriculture also provides good opportunities for economic development in rural areas for most Sub Sahara African countries (International Fund for Agricultural Development, IFAD, 2010). It is also critical for poverty reduction (Schaffnit-Chatterjee, 2014). Economic growth also improves food security by increasing access to food (Meade et al., 2013). The sector being the largest employer in developing countries, its growth significantly increases income generation, reduces poverty and food prices (Asenso-Okyere & Jemaneh, 2012). A food security situation exists when all people at all times have physical and socio-economic access to enough, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life (FAO, 2009; UNDP, 2012). For food security to be achieved food has to be available, accessible and adequate (Mwaniki, 2012; UNDP, 2012). Raising agricultural production and productivity can sustainably increase farm food supplies and consequently improve food security (Asenso-Okyere & Jemaneh, 2012; Ncube et al., 2012). In Kenya, since agriculture contributes about 26% of GDP directly and 25% indirectly, it is therefore considered the backbone of the country's economy (GoK, 2010). For instance in the year 2010, the sector grew at 6.3%, from negative 2.9% in 2009 translating to GDP growth from 2.6% to 5.6% in the same period (KNBS, 2011). The sector is a

source of food, employment and income (Biwott et al., 2013). It also accounts for about 65% of the total national exports and 18% of informal employment in rural areas. This shows that agriculture is very critical in the achievement and sustenance of food security.

Wildlife forms the base for the tourism industry (Vernon, 2010; Wanyonyi, 2012). The industry is large and fast growing besides generating 5% of global GDP in 2011 and 7% of employment opportunities worldwide (GoK, 2008; UNCTAD, 2013). It is ranked the fourth largest industry in the world (Honey & Gilpin, 2009). The government of Kenya identifies the tourism industry as one of the growth engines for the national economy (Wanyonyi, 2012). The tourism sector contributes 13% to Kenya's economy, 12% of GDP and 19% of the total wage employment (Vernon, 2010). It contributes significantly to local and national economy (Laikipia Wildlife Forum, LWF, 2012; Ministry of Forestry & Wildlife, MFW, 2011). This is evidenced by its contribution where in 2005/2006 financial year, tourism generated 25% GDP and more than 10% of the total formal sector employment. The sector is therefore identified as one of the key drivers for the achievement of economic development as envisaged in the national development plan called Vision 2030 (Laikipia Wildlife Forum, LWF, 2012). However, the interaction between wildlife and people results in human-wildlife conflict (GoK, 2012; MFW, 2012). Thus, despite wildlife being the base for the tourism industry which is significant in Kenya's economy, it contributes to human-wildlife conflict.

## 2. Statement of the Problem

Agriculture is important in Kenya's national economic development, income and employment creation and providing raw materials for industries. One of the challenges affecting the agricultural sector is the human-wildlife conflict which results from human encroachment on wildlife habitats. It may also arise from the movement of wildlife out of their unprotected habitats such as Rumuruti Forest or protected areas into adjacent farmland. Despite the human-wildlife conflict being experienced by farmers, the government identifies the tourism industry as one of the key engines of economic development with wildlife being the base for the industry. Wildlife freely and easily moves out of their habitat into the surrounding farmland where they damage crops, injure or kill livestock or even people. Available information on the effect of human-wildlife conflict on household food security among small-scale maize farmers was inadequate or poorly documented. This study sought to avail the information to policy makers and agricultural extension providers to enable them plan better on how to reduce food insecurity arising from human-wildlife conflict.

## 3. Objectives of the Study

This study was guided by the following objectives:

- i) To establish the severity of crop damage arising from human-wildlife conflict among small-scale maize farmers in Laikipia County.
- ii) To determine the human-wildlife mitigation strategies used by small-scale maize farmers in Laikipia County.

## 4. Research Methodology

This study was conducted through document review and analysis. Document review was achieved using a document review guide which was developed by the researcher and validated by agricultural education and extension experts of Egerton University. The review guide sought to collect information on the severity of crop damage and the mitigation strategies used by small-scale farmers in Laikipia County.

### Severity of Human-wildlife Conflict

Human-wildlife conflict occurs when wildlife requirements encroach on human requirements (FAO, 2009). It is a problem experienced globally in areas where people and wildlife interact and share limited resources (Musimbi, 2013). The conflict is not restricted to any geographical area or climatic condition but it is common in areas where wildlife and people coexist and compete for scarce resources (Le Bel et al., 2011). It is also experienced among people residing adjacent wildlife habitats (Hemson et al., 2009). Human-wildlife conflict involves different birds, mammals, fish, insects and reptiles (Gandiwa, et al., 2013). Wildlife therefore moves out of their habitat and damages crops, injures or kills livestock or even people, transmits diseases and also damages property (FAO, 2009; Musimbi, 2013; Musyoki et al., 2012; Waithaka, 2012). Therefore, conflicts occur between wildlife and the farmers neighboring wildlife habitats (Hill & Wallace, 2012; Riley & Priston, 2010;

Strum, 2010). Furthermore, animal-man interaction conflicts have been in existence for as long as humans have existed, and shared landscape and resources in various parts of the world. In America, Bears attack dustbins in towns of Northern USA, Deers collided with automobiles injuring 29,000 animals in Northern Alberta, Canada between 1992 and 1996 wolves killed 2, 806 livestock (cattle and sheep); in Idaho, Montana and Wyoming (USA), between 1987 and 2001, wolves killed 728 livestock (Musimbi, 2013). In Ghana, human-wildlife conflict is common around wildlife conservation and water areas (Stuttgart, 2011). In rural Kenya, the conflict is a significant problem especially in areas where wildlife habitats border farmland (Graham et al., 2009a). The conflict is also prevalent in areas where people live adjacent forest resources (Waithaka, 2012; Wallace & Hill, 2007). The landscape in Laikipia County holds the second largest wildlife population in Kenya although it is not protected or gazetted as a wildlife habitat (Litoroh et al., 2010; Maximillian et al., 2011). Wildlife therefore easily moves out of their habitat into the neighboring landscape which comprises communally-owned pastoral areas and small-scale farms (Graham & Ochieng, 2008). Further, the use of large areas of natural habitat occupied by wildlife for agricultural activities initiate human-wildlife conflict in form of crop damage (LWF, 2012). This shows that human-wildlife conflict can be severe especially in areas where wildlife habitats border farmland, allowing wildlife to freely move into farmland thus attacking livestock and damaging crops.

Although on a national scale a loss of 2ha of maize in a single day to wildlife may seem insignificant, to the household concerned it may mean a loss of a year's food supply (Graham et al., 2010). The loss may also mean the difference between self-sufficiency and starvation. Crop damage ultimately affects a household's capacity to feed its members, reduces income, and affects their health, nutrition, education and general community development (FAO, 2009). After crop damage, finances are also diverted from meeting other household needs to buy food. Human-wildlife conflict reduces agricultural productivity and economic opportunities (Ministry of Natural Resources of Ontario, MNRO, 2008). Out of the 1 billion people who are undernourished in the world, about 30% (239million) live in Africa (Mwangi et al., 2013; UNESC, 2012). This results from low agricultural production and poverty (Mwangi et al., 2013; Ncube et al., 2012). In East Africa, it results from low harvests, civil insecurity and human-wildlife conflicts (GoK, 2012; Kathuri et al., 2011; Stuffung, 2011). Consequently, whereas Africa imported 43 million tonnes of food in 2011, Kenya has experienced food deficits over successive years (Stuffung, 2012). Food security is low in the pastoral areas of African countries (Ncube et al., 2013). The agro-pastoralist clusters in Kenya cover the areas of Kajiado, West Pokot, Baringo, Kieni East, Kieni West and Laikipia Sub Counties (GoK, 2012). Maize crop is a major staple food in Kenya and therefore its deficits and unavailability is considered synonymous with low food security (Stuffung, 2011). In Laikipia County, staple foods include maize, potatoes and beans. Maize deficits in Kenya was up to 35% below the annual average production in 2011, necessitating imports (GoK, 2012). A total of 3,750, 700 and 2, 157, 800 people needed food aid in the pastoral

and marginal areas of Kenya in 2011 and 2012 respectively (GoK, 2012). During the same period, in Laikipia County, about 61,900 and 56,600 people needed relief food in 2011 and 2012 respectively. This might have been caused by a decline in maize production (GoK, 2013). The maize deficits experienced in Laikipia County could be resulting from the human-wildlife conflict experienced among the small-scale farmers. This shows that human-wildlife conflict has a potential to affect the food available to a household through crop damage

### Human-wildlife Conflict Mitigation Strategies

Farmers use different strategies to mitigate human-wildlife conflict such as guarding (animal & human), barriers (fence, trench, walls or erecting a buffer zone) or repellents (chemical, auditory) (Treeves, 2007). Some farmers grow crops that are unpalatable to wildlife and also grow heavily attacked crops beyond a buffer of unappealing crops (Hocking & Humle, 2009). Others chase or scare away wildlife while others use African honey bees as barriers against wildlife (Karidozo & Osborn, 2007; King et al., 2011). In Uganda, small-scale farmers use barriers like fences, humans guard against wildlife and also use repellents (Wallace & Hill, 2007). Farmers in Mozambique make loud noise and light fires to scare away wildlife, and also use chilli barriers (Anderson & Parieda, 2005). The Kenya Wildlife Service promotes the growing of crops that are unappealing to wildlife such as chilli or establishment of barriers such as ditches (Hocking & Humle, 2009; Musimbi, 2013). Agriculture extension also promotes growing of unpalatable crops such as chilli, digging of trenches, agroforestry practices, use of African honey bees and life fences (Karidozo & Osborn, 2007; King et al., 2011; Mc Guinness & Taylor, 2014; MoA, 2009). In Laikipia County, extension also promotes forest conservation, fodder production and fruit and woodlot production (GoK, 2013). Farmers in the Tsavo Conservation Area (TCA) of Kenya make loud noise, erect scare crows, burn hot pepper and light fire to scare away wildlife (Makindi et al., 2014). They also burn animal manure to produce offensive smell, guard using dogs besides chasing away the wildlife. In Laikipia County, farmers use traditional wildlife mitigation strategies such as lighting fire, use watch towers, make loud noises and guard their farms against invasion by wildlife (Graham et al., 2009b). The farmers also use farm-based deterrents such as fire-works, powerful lights and chilli-grease fences. This shows that small-scale farmers including those in Laikipia County use various traditional human-wildlife mitigation strategies. Despite the various strategies being promoted and farmers adopting some of the strategies, they still experience significant crop damage.

### 5. Research Results, Conclusion and Recommendations

This study established that human-wildlife conflict is common in areas where wildlife and people share and compete for resources, especially where farmers border wildlife habitats. In some cases wildlife habitats are not protected thus allowing wildlife to easily move into adjacent farmland. Wildlife therefore moves into the neighboring farms frequently and damage crops severely by up to 98% of

total hactherage. Such severe crop damage significantly affects the overall crop yield. Wildlife move into the farmland neighboring their habitat frequently and severely damage crops. Additionally, small-scale farmers use various human-wildlife conflict mitigation strategies, most of them being traditional in nature. It was therefore concluded that small-scale maize farmers in Laikipia County could be suffering from food insecurity resulting from the effect of human-wildlife conflict. It was therefore recommended that a study be undertaken to establish the effectiveness of human-wildlife conflict mitigation strategies used by small-scale farmers in Laikipia County. Further, a study should be done to determine the influence of agricultural extension mitigation strategies on human-wildlife conflict among small-scale farmers in Laikipia County.

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