

2022

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Recommended Citation

Mamboleo, Abel A. (2022) "International and domestic tourist hunting: A critical review on environmental and socio-economic implications in Sub-Saharan Africa," *Journal of Sustainability and Resilience*: Vol. 2 : Iss. 1 , Article 3.

Available at: <https://digitalcommons.usf.edu/jsr/vol2/iss1/3>

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Publisher's Note: Journal of Sustainability and Resilience (JSR) (ISSN:2744-3620) is published bi-annually by the Sustainability and Resilience Institute (SRI) of New Zealand. The opinions expressed in this paper are those of the authors and do not necessarily reflect the official policy of SRI. SRI remains neutral about jurisdictional claims in published maps and institutional affiliations.

International tourist hunting in Africa: a review on environmental and socio-economic implications in Sub-Saharan Africa

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Received: 23/12/2021

Revised: 10/02/2022

Accepted: 11/02/2022

Published: 14/02/2022

Abstract: Tourist hunting is a regular consumptive wildlife utilization occurring within and outside core protected areas for trophies and leisure attainments. It is one of the most renowned tourism undertakings which involve the killing of animals for recreational purposes. In essence, hunters acquire trophies for different purposes including production of decorations and traditional medicines. Currently, there is a hot debate on whether to continue or cease tourist hunting as animal activists, some conservation stakeholders believe that hunting is cruel to animals and threat to ecosystems. In this paper, the author reviewed and analyzed various documented evidences which opponents and proponents of the debate published to conclude whether the consequences of trophy hunting are real or overstated. Better understanding of those consequences becomes necessary as it helps stakeholders understand whether tourist hunting is fair or unfair. Tourist hunting may cause constructive and destructive consequences on environment and socio-economic livelihoods which however depend on type of hunted species, age, sex of hunted animal, season of hunting and hunting methods. It may cause species extinction, disrupts the population structure of hunted species, emissions of greenhouse gases, production of recyclable and unrecyclable wastes, change of animal behaviors and overhunting. In short, the overhunting of wildlife resources due to trophy hunting might be less or equal to the wildlife overharvesting caused by poaching, wildlife trafficking and capturing of wildlife to supplement zoological gardens. According to studies, tourist hunting seems to have less destructions than other forms of tourist activities and wildlife utilizations as many conservation agencies have well described policies and laws to regulate tourist hunting operations. Debaters confuse between tourist hunting and poaching. Tourist hunting is the legal killing of animal to obtain certain part of an animal by following specified hunting regulations while poaching is the capturing or killing and animal for either a part of the entire animal with or without the valid hunting license. A hunter with a valid trophy hunting license violating any of hunting regulations including with prohibited hunting gears, or hunting off season, or hunting more animals than specified in the license, or animal of different sex or age, such a tourist hunter turns into a poacher.

Keywords: traditional hunting; trophy hunting, resident hunting.

1. Introduction

Tourist or trophy hunting is a consumptive wildlife utilization which takes place inside or outside private or public protected areas for trophies and leisure attainments. It is one of the most renowned tourism undertakings around the world that involve the killing of animals for recreational purposes (CRS, 2019). In essence, hunters acquire trophies for different uses including production of decorations and traditional medicines. Trophies are of different forms such as animal heads, skins, ivories, horns and tails from prominent games species including lion, leopard, buffalo, elephant and rhinoceros for traditional rituals (Taringa, 2016).

There has been a hot global debate on whether to stop or continue with tourist hunting. Also, there is a confusion between licensed trophy hunting and poaching due to lack awareness among debaters. Congressional Research Service (CRS) emphasizes that trophy hunting is the legal killing of animal to obtain certain part by following specified hunting regulations while poaching is the capturing or killing and animal for either a part of the entire animal with or without the valid hunting license. Moreover, CRS insists that hunter with a valid trophy hunting license when hunts animals outside specified area, or hunts animals with prohibited or restricted hunting gears, or hunting off season, or hunts more animals than specified in the license, or hunting different type of animals, or the animal of different sex or age, such person is normally described as a poacher.

In this paper, the author reviewed and analyzed various documented evidences to conclude whether the consequences of trophy hunting are real or overstated. Better understanding of those consequences is necessary as it may help to make decision whether to continue or cease tourist hunting. Currently, there are several studies that evidence consequences of trophy hunting though most of them lack sufficient information and analysis on the relevance, severity and legitimacy of trophy hunting consequences. Moreover, many studies have unfairly conclusion on the matter. Therefore, such studies provide superficial comparisons between the consequences of trophy hunting and other forms of wildlife utilizations. It

is therefore the task of this paper to review on types and severity of both constructive and destructive consequences of tourist hunting on environment and socio-economic aspects of the hunting grounds.

2. Literature Review

In Africa, trophy hunting began during pre-colonial period when traditional hunters pursued game species to secure traditional cherished trophies. In pre-colonial Africa, trophy hunting occurred in communal land for traditional rituals (Cleveland et al., 2012). In that time, trophy hunting inflicted relatively trivial impacts on wildlife species due to ingenuous hunting weapons, few hunted animals, well established and respected traditional rules and absence of international trade on trophies (Hasler, 2000; Taringa, 2016). Later, a colonial administration in Africa restructured trophy hunting procedure by establishing and enforcing hunting regulations, which stipulated and specified the hunting areas, game animals and hunting procedures. The administration modernized trophy hunting industry to reflect western civilization which excluded traditional hunters due to strict regulations and elevated hunting fees.

Furthermore, many areas with enormous game diversity were confiscated by colonial governments, demarcated and gazetted as public game reserves (Badenhorst, 1996). In many parts of Africa, some ancient gazetted areas such as Seolus Game Reserve in Tanzania, are still managed as game reserves and national parks until now (Hasler, 2000; Taringa, 2016). Traditional hunters were inevitably isolated from game and utilization as they could not afford to pay for game hunting fee and licenses (Newsome and van Eeden, 2017). Game hunting was crucial in colonial regimes as their livelihoods and economy entirely depended on skins, ivories, manes and other treasured trophies not only as raw materials for their industrialization but also as currencies to exchange in the barter trade. Soon after inception of western hunting procedures, trophy hunting started causing a drastic decrement in species diversity (Hasler, 2000;

Taringa, 2016). It is because in the beginning, the colonial administration thought modern hunting gears and massive gazettements of game reserves were the only scientific criterion to enhance sustainable tourist hunting (Turtenwald, 2018).

Trophy or tourist hunting widespread in Africa in 1970s, this was the time when wildlife conservation world began to experience serious environmental impacts from trophy hunting (Cruise, 2019). To make the record right, this was also the time when the majority of African countries had already attained their independences but were still enforcing colonial trophy hunting ordinances. In the late 1970s, the consequences of trophy hunting amplified exponentially due to enormous commercial poaching on keystone species in particular African elephant (*Loxodonta Africana*), black rhinoceros (*Deceros birconis*) and lion (*Panthera leo*) (Thouless et al., 2016), and it was difficult to technically differentiate between the adverse impacts of trophy hunting and commercial poaching. In early 1980s, environmental conservation issues emerged and gained its momentum (Chandel and Mishra, 2016). It coincided with a time when a universal campaign on animal rights was gaining its momentum (Little, 2015). Some animal activist's groups allied with environment conservation groups to end cruelty to both domesticated and wild animals by publicly criticizing tourist hunting and laboratory experimentations of animals (Finsen and Finsen, 1994).

Currently, there is a hot debate on whether to continues or cease tourist hunting, some conservation stakeholders claim that hunting is cruel to animals and it drives some species to extinction (Badenhorst et al., 2014). The main proponents of this argument are animal and environment activists and the opponents are trophy hunters. However, there are also mixed insights among environmentalists and tourists on trophy hunting as some of them enthusiastically support trophy hunting while others desperately discourage it. According to opponents, trophy hunting is environmentally and socio-economically unfriendly while the proponents publicize it as environmental constructive tool and economically earning entity. Each debating

party attempts to justify the legitimacy of its arguments by producing various supporting evidences. In short, the debate centers on animal welfare, rights and utility. Of all, the most discussed point is sustainability and extinction of wildlife resources, in particular consequences on the environment, conservation status of the hunted species and socio-economic integrity of the hunting destinations. Tourist hunting grounds are in government, community or private protected areas (Badenhorst, 1996; Cruise, 2019; WWF, 2019).

Trophy hunting procedure vary among countries due to difference in species diversity, conservation policies, climate, hunting seasons, culture and hunting regulations (Badenhorst, 1996; Cruise, 2019; Lindsey, 2008; Turtenwald, 2018). The US produces the majority of trophy hunters in the world and is the main importer of hunted trophies globally by importing ten times more than China, which is the second importer (CRS, 2019). Some hunting grounds become more famous than others. The most famous hunting grounds in Africa are in Eastern and Southern Africa (HS, 2016). Despite the differences of hunting grounds in many hunting aspects and procedure, the consequences of trophy hunting on the hunting destinations may be the same.

3. Materials and methods

This article employs a documentary review approach by reviewing and analyzing published articles, unpublished research, government and non-government organizations reports, books, online resources, newspaper clippings, articles, websites, documentaries, local and international policies, and social media where 46 library and online resources, and 34 newspapers clippings were reviewed. Keywords including trophy hunting, tourist hunting and resident hunting in Tanzania, socio-economic development of tourist hunting in Tanzania, trophy outfitters in Tanzania, ecosystem, traditional hunting, environmentalists and trophy hunting were used to search for relevant documents from internet, electronic and conventional libraries. During

searching each keyword was used individually to search a needed literature.

All literatures for this study were selected basing on their relevance to the topic. Due to rarity of literatures on consequences of trophy hunting, there was no limitation or sample size on the number of literatures selected for this study, the literatures were selected through google scholar, google search engines and library database. The newspapers clippings were obtained from the Department of Tourism and Hospitality Management of Saint Augustine University of Tanzania, as a collection from local (Tanzania) and regional (East Africa) newspapers. The newspapers were published in the printed media. The consequences of trophy hunting were categorized into constructive and destructive from each literature by listing.

4. Research findings

Tourist hunting has both constructive and destructive consequences depending on type of species, age, sex of hunted animal, season of hunting and hunting methods. Studies assert that tourist hunting contribute to increment in size of conservation land for conservation of wildlife

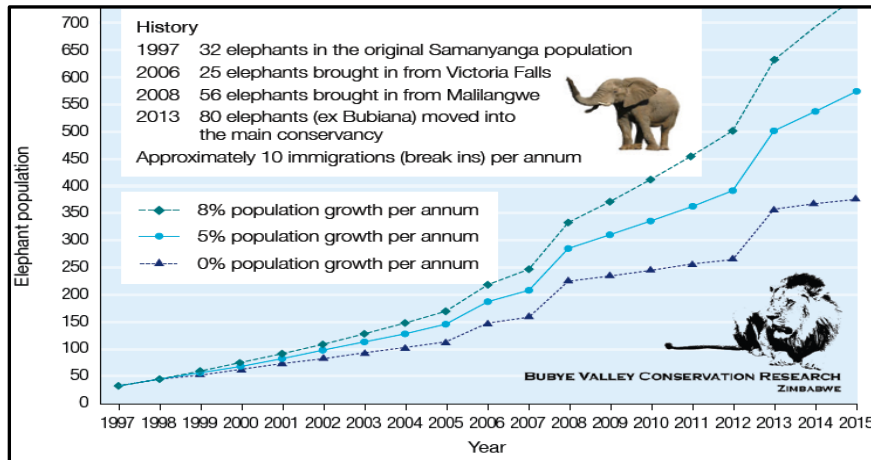
species, provides socio-economic opportunities and conservation fund, contributes to cultural manifestation of tourist hunters, controls populations of hunted species and problem animals in the areas where there are human-wildlife conflicts.

Table 1. Revenue generated from tourist hunting and photographic tourism to the Ministry of Tourism and Natural Resources in Tanzania, this kind of tourism generates the bulk of the income in direct revenues by Tanzania’s Wildlife Division from reserved land through variety of fees. However, most of these revenues are returned to the Central Treasury and only 25% is directed to Tanzania Wildlife Protection Fund, also the entails that tourist hunting generates more revenues than other tourism activities including photographic tourism.

Financial Year	Revenues from Tourist Hunting (US\$)	Revenues from Photographic Tourism (US\$)
2009 - 2010	18,444,881.00	2,706,603.00
2010 - 2011	23,536,347.00	2,706,603.24
2011 - 2012	15,063,217.75	2,080,978.00
2012 - 2013	15,917,430.93	3,904,808.00
2014 - 2015	16,277,373.00	4,736,187.00
2015 - 2016	11,215,723.00	3,041,225.00

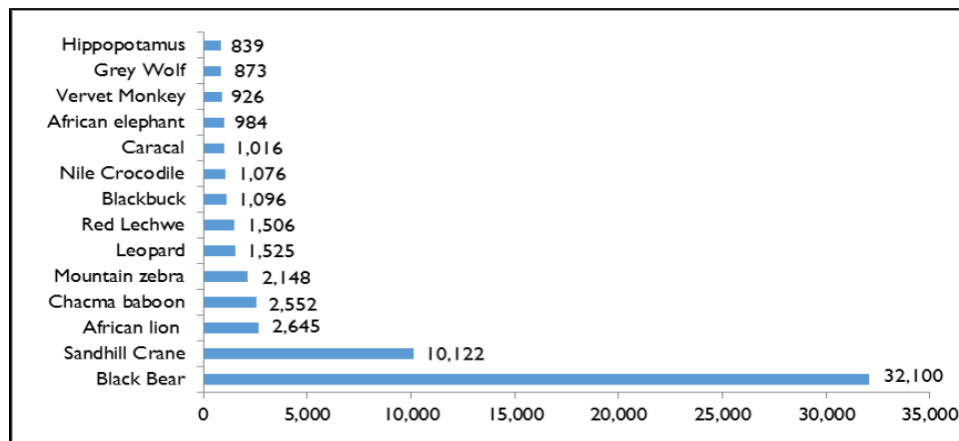
Source: IUCN (2019).

Figure 1. Buby Valley Conservancy, a private conservancy in Zimbabwe on land previously used for farming, is dependent on limited trophy hunting to fund wildlife protection and conservation. Lion and African Elephant populations have grown steadily. It is one of constructive consequences of trophy hunting by converting agricultural marginalized land into hunting grounds.



Source: IUCN (2019).

Figure 2. The number of selected CITES-Listed Species Trophies imported into the United States with a permit most of these game species suffer local or global extinction because of trophy hunting especially when it involves endangered species, according to the figure, African lion one of the most hunted species in trophy hunting.



Source: CRS (2019).

In case of destructive impacts, tourist hunting causes species extinction, disrupts the population structure of certain species, contribute to greenhouse gases emissions, production of animal wastes, disrupts animal behaviors and overhunting of wildlife species. In case of species extinction, overhunting, hunting of prohibited species and hunting with forbidden hunting gears but in most cases, uncontrolled trophy hunting results in overhunting. As a consequence, the game species suffer local or global extinction.

5. Discussion

Socio-economic benefits accrued from trophy hunting are the main motivations for people to conserve wildlife species in communal and private land. For example, mushrooming of community-based natural resources management (CBNRM) schemes and private reserves in some countries have overshadowed the competing land uses such as livestock keeping, urbanization and farming. In other words, landowners turn their land into wildlife reserves (Hasler, 2000; UNEP, 2013; WWF, 2019) which increase landscape for species conservation and opportunities for generation of tourism-based benefits. Moreover, it engages landowners in wildlife-based conservation and restoration initiatives such as antipoaching

operations and breeding of threatened wildlife species. Furthermore, trophy hunting turns agricultural-marginalized and highly infested tsetse fly infested areas into private and community trophy hunting grounds as an alternative beneficial land use. Agricultural marginalized areas are often regarded as waste lands due to their unproductiveness for farming and livestock keeping.

In Namibia, trophy hunting resulted in the establishment of communal conservancies covering nearly 14% (12 million hectares) of the country's landmass (UNEP, 2013). WWF (2019) evidences that 19 established WMAs have added 3% to the total surface area reserved for wildlife in Tanzania, which now totals 31%, however, when the other 19 proposed WMAs being gazzeted, WMAs will make the total land area under community conservation to over 10% (about 300,000 km²) of the country's surface area. In 1980, Zimbabwe dedicated only 12% of her land to wildlife management, all within government protected areas (Hasler, 2000). Up to 2000, the reserved land in Zimbabwe totaled 33% after an inception of CAMPFIRE program. In other words, the program had added 21% to the entire reserved land in Zimbabwe; in case of surface area, the CAMPFIRE program outweighs more than twice of the total reserved area covered by the government reserves. In short, the private

hunting operations in Africa manage about 1.4 million km² of land, which is 22% more land than is protected by national parks (Cruise, 2019). In other words, the size of private hunting grounds in Africa, which is also the marginalized land are more than 3 times the size of the U.S. National Park System, roughly two times the size of the U.S. National Wilderness Preservation System, and more than twice the size of the U.S. National Wildlife Refuge System (Semcer, 2019).

Also, the governments usually accrue revenues through issuance of permits, licenses, concessions and taxes. It generates more revenues per tourist than any other form of tourism in sub-Saharan Africa (Lindsey, 2008). Lindsey and colleagues advocate that trophy hunting generates 30 times more revenues than photographing ecotourism in Zimbabwe and Tanzania. Semcer (2019) estimates that the cash revenue generated by trophy hunting in Africa vary between \$190 million and \$326.5 million annually. According to Semcer, even at the lower end of the estimated revenue generation, revenues from trophy hunting are still almost one-third higher than the \$142 million generated as entrance fee from ecotourism in 14 African countries. Governments usually reinvest a portion of the cash revenues in sustainable wildlife conservation. A successful and timely reinvestment make such revenues to exhibit “biodiversity umbrella effect” as conservation authorities use them for conservation of non-hunted species as well (Bashqawi, 2014). Reinvestment of the revenues in wildlife conservation usually determine the efficacy and relevancy of contribution of trophy hunting to conservation (Bashqawi, 2014; UNEP, 2013). The more reinvestment of revenues the more important trophy hunting becomes in wildlife conservation.

Protecting all the world’s threatened species, including the most hunted species in hunting grounds, costs around 4 billion US dollars a year (Cressey, 2012). The costs seem very large but in terms of government budgets, species abundance, tourist activities, funding and country’s surface area they are quite

reasonable. Cressey cautions that annual costs are a fraction of the value of nature’s ‘ecosystem services’. However, there is a notable variation in the extent of revenues reinvestment in conservation among countries of which some governments or agencies invest more than others. Tanzania, as an example, reinvests 25% of hunting revenues in wildlife protection through the Tanzania Wildlife Protection Fund (Table 1). In addition, high spending trophy hunters may lead to increased business activities in the community’s nearby trophy hunting grounds (van der Merwe and Saayman, 2014). As results, trophy hunting engagements amplify direct and indirect employment opportunities in the communities (Hasler, 2000; Lindsey, 2008). Yet, the distribution of trophy hunting revenues may vary among hunting destinations. The trophy hunting revenue sharing between the governments and communities ranges between 0 and 100%, where the communities may get between 0 and 100% depending of the country’s policy. As an example, Tanzania spends 25% of trophy hunting revenues to support community development projects (Revelian, 2016). Moreover, trophy hunting produces less economic leakage than other types of tourism about 92% of tour hunting companies are based in the countries where the hunting takes place (Lindsey, 2008). In that circumstance, most of the revenues accrued from trophy hunting businesses remain in the hunting destinations.

Despite the mixed opinions on history and trophy hunting procedure, there is a relationship between trophy hunting and prestige. In African perspective, trophy hunting involves killing of game species for acquisition of certain trophies of with cultural value (Packer et al., 2010). The African definition of trophy hunting entirely relies on the type, quantity and quality of trophies rather than hunting methods and sophistication of weapons used to kill the animals. In that case, trophy hunting endeavor becomes important in the contentment of traditional rituals among ethnic groups. Traditional groups use the resultant trophies for coronation, marriages, traditional medication and ornamentation. It is an ancestral cultural

practice in some African countries with enormous wildlife resources. Shona people in Zimbabwe, in particular the Manyika as an example, regard leopard as a royal game. In the past, it was taboo for them to kill the leopard for traditional healing and traditional leadership.

However, leopard was only killed when the famous traditional healers or traditional leaders wanted a skin. In other words, it was mandatory for traditional hunters to obtain an informal hunting permit from the traditional authority without which the leopard could not be killed (Taringa, 2016). In essence, hunting for traditional rituals inflicted relatively low environmental impacts than it does nowadays as it was entirely regulated by traditional laws. Hunters respected traditional laws, which also restricted the hunting of certain species but currently traditional hunting occurs in the haphazard manners while inflicting enormous environmental impacts as it usually targets rare or threatened species. However, most African countries have insufficient control over traditional trophy hunting today.

Masai from Tanzania, as examples, have killed 2% of lions in Serengeti ecosystem for traditional ritual (Packer et al., 2010). In the past, western civilization disregarded traditional hunting as trophy hunting due to adoption of primitive hunting weapons and procedure. It is within this concept the western hunting culture reputed trophy hunting as a symbol of western civilization. As results, hunting regulations and procedure in the African hunting grounds still uphold the same concept by classifying the game hunting into tourist and resident or local hunting where tourist hunting is designed for highly paying tourists while resident hunting is for local people who hunt for meat only. Furthermore, hunters prefer wild to domestic animals' as it is a cage free and organic food. It is the growing concern regarding inorganic or chemical agriculture around the world (Gothunts, 2016). People avoid consumption of artificially grown food. Hunters prefer meat acquired through trophy hunting to domestically raised as it is chemically unprocessed. The games lack artificial hormones, antibiotics, herbicides or

questionable chemicals because they are raised in the wild.

Trophy hunters take part in the physical control of wildlife populations and eradication of alien invasive species. Such species usually lack natural predators to regulate their population. Absence of sufficient control measures may elevate the population size and status of alien invasive species into the most disastrous pests. Invasive species threaten ecosystem health, damage agricultural crops and transmit diseases to livestock, humans and wildlife. For instance, wild pigs (*Sus scrofa*), an invasive species in the US causes over one billion US dollars agricultural loss (Burton, Westervelt and Ditchkoff, 2013). As a result, the US government deploys lethal methods, which include trophy or recreational hunting, to control their population. When the population of invasive species exceeds environmental carrying capacity, it threatens the environment itself, lives and properties. In that case, conservation authorities allocate hunting quotas to hunting companies to reduce their populations. It is also worthwhile to reduce excess individuals and deadly invasive species from the reserves. Moreover, trophy hunting reduces old and infertile animals, which are economically, socially and environmentally unprofitable. Conservation agencies dispose bachelor herds or floaters through trophy hunting to reduce male intraspecific competitions for breeding mates which amplify stiff breeding competitions during breeding seasons. This is noticeable in social animals like impala of which one male usually owns more than 30 females. When number of males exceeds that of females it causes endless fighting among males which usually interferes with feeding and breeding time for males (Gothunts, 2016).

Also, trophy hunting may serve as immediate control measure of human-wildlife conflicts (HWC) which usually cause deaths of wildlife, people and livestock, infrastructural damage, property and crops damage, and transmission of diseases to ether livestock or people. Prevalence and severity of HWC differ between species, countries, seasons and the type of

protected areas. Incidents of HWC mostly occur in areas core protected areas. Human-carnivore conflict is one of the types of HWC (Graham et al., 2010). There are about 226 carnivores in the world, of which nearly all are predators (Treves and Karanth, 2003). In Africa, humans have been interacting with carnivores for about 4 million years now (Treves et al., 2006). Consequently, crocodiles have preyed on humans and their predecessors in Africa for about four million years (Lamarque et al., 2009). Treves (2007) reported that in Uganda lion, leopards and spotted hyena caused about 393 casualties between 1923 and 1994. Lamarque et al. (2009) reported that crocodiles in Mozambique killed about 300 people each year and many more deaths remain unreported due to communication barriers. In Kashmir region of Pakistan, leopard killed 363 livestock between 2004 and 2007. Similarly, Gusset, Swarner, Mponwane, Keletile, and Mc Nutt (2009) found that carnivores caused a financial loss of about 57,000 USD in northern Botswana. In the US, predatory carnivores killed more than 490 sheep and lambs, 83,000 goats and 106, cattle, resulting in the financial loss amounting to 2 billion US dollars. Ladan (2014) estimated that between 1990 and 2004, lions had killed about 563 people in Tanzania.

Asian elephants also caused significant agricultural destructions to farmers, for example in India, elephants destroyed about 1 million hectares of agricultural crops (Barua, Bhagwat and Jadhav, 2013), it also demolished between 10,000 and 15,000 houses. This makes annual agricultural damage by elephants in India to worth 3 million US dollars (Barua et al., 2013). Each year elephants kills people, injures people and destroys people's property in Africa and India (Barua, 2014). Indian elephants kill about 200 people in India per year (Woodroffe, Thirgood and Robinowitz, 2005). Elsewhere in Kenya, African elephants killed 200 people between 2000 and 2007 (Ladan, 2014). District records in Tanzania reveals that African elephants killed about 40 to 50 people and injured nearly 30 to 40 people (Mduma et al., 2010).

Due to massive economic losses and, interminable annoyances and mortalities, some countries authorize disciplinary killings to responsible animals to reduce their adversative impacts. The government of Norway eradicated the remnant population of wolves due their excessive predatory impacts on sheep in 2005 (Muruthi, 2005). Likewise, in 2003, pastoralists poisoned all lions in Amboseli Reserve and speared about 27 lions in Nairobi National Park as retaliation for killing their livestock (Lamarque et al., 2009). Uganda government attempted to eradicate all problem carnivores by killing 106 leopards and 376 lions between 1920 and 1960, as if it was not enough, the government of Uganda rewarded the people who killed any carnivores (Treves, 1999). Furthermore, 15 elephants were killed by rural people as retaliation for crop damage in Kilimanjaro region between 1996 and 1997 and speared to death 141 elephants in Amboseli ecosystem of Kenya between 1974 and 1990 (Muruthi, 2005).

Since retaliatory killing of problem animal is unprofitable and unprofessional, some governments assign the tasks of to monitor populations of problem animals to animal control units as well as commission trophy hunters to reduce their populations through recreational hunting. Studies acknowledge the trophy hunting option as cheaper, safer, more effective, and more profitable than most control units and local people. However, the approach is only limited to incidents involving males because trophy hunting kills male animals only. In certain cases, the hunting of problem animals takes place in hunting season when incidents occur during off hunting season. The allocation of hunting quota may be delayed due to beauracracy. In some countries, trophy hunting is timely and accurate because the trophy hunting companies own relatively sophisticated resources to monitor the problem animals in different types of terrains, weather and time. Even so, trophy hunting only controls some species not all species and individuals because it only focuses on species with stunning and enormous trophies. In other words, trophy hunting ignores unappealing and unmarketable species and individuals. Unfortunately, trophy

hunting excludes the most disastrous pests in the world such as rodents, *Quelea quelea* and locusts because they lack saleable trophies. As a result, the governments exclude such species from hunting quota. The problem animals controlled by trophy hunting include lions, buffalo, leopard, elephants and rhinoceros.

In the case of destructive impacts, trophy hunting causes about 25% of species extinctions in the world (Gothunts, 2016; Turtenwald, 2018). It caused the disappearances of Dorcas gazelle (*Gazella dorcas*) and Nubian bustard (*Neotis nuba*) from Sahelian Africa in 1980s (CRS, 2019). Species extinctions usually has multiplier ecological, cultural and socio-economic impacts, especially, when trophy hunting involves a charismatic or keystone species. There are plants, wild animals and human beings that entirely depend on the overhunted species to survive. For example, the local extinctions of elephants from some reserves led to the disappearances of several plant and animal species (Baxter, 2003; UNICEF, 2013).

Also, trophy hunting usually drives critically endangered, young, pregnant and migrant species closer to extinction notch. Also, it interferes with natural ecological processes such as wildlife migration and hydrological cycles. The presence of conservation corridors, water sources and migration routes in the hunting grounds, interferes with wildlife natural migration. The blocked migration routes encircle the migratory species in ecological islands, which in turn subject them to inbreeding and starvation due to insufficient ecological resources particularly in the dry seasons. The situation because catastrophic when hunting grounds have imperfectly established tourist roads, where trophy hunters drive off roads when searching for animals. Most studies underestimate the cumulative impacts of off-road driving particularly on ecological processes, vegetation, and crawling species. The use of forbidden hunting gears and methods, such as firearm capable of firing more than one ammunitions at once, normally affect the population of some game species. Unethical trophy hunters use trapping snares that

unselectively kill young, female and critically endangered species. Moreover, the use of lead ammunitions for trophy hunting directly affect the trophy hunters and indirectly contaminate the soil, water, and vegetation.

Trophy hunting kills individuals of certain age, sex and qualities from the population. It involves the killing of physically fit and the most morphologically appealing species (Bashqawi, 2014; Packer et al., 2010). It wipes out most males responsible for guarding and directing the families to the safest feeding grounds. Furthermore, most breeding females choose the breeding mates based on their physical and genetical individualities. In absence of fittest males, females may abstain from breeding and cause population crash to the hunted species. In those situations, trophy hunting does not affect only the population size and structure but also the sex ratio, fecundity rate and age structure by reducing males and adult individuals from the population (Packer et al., 2010). Trophy hunting also affects appreciation and valuation of some species by causing some species to be more famous and valued than others (Cruise, 2019; UNEP, 2013). Trophy hunters consider hunted animals or game species as the only valuable wildlife species in the world which causes some protected areas or countries to be visited more visited than others. For example, Tanzania is the most famous destination for hunting of buffalos, leopards and lions and tour outfitters use these animals to market their companies and the hunting destinations to attract tourists (HS, 2016).

Moreover, trophy hunting contributes to climate change through greenhouse gases emissions. Trophy hunting emits greenhouse gases through travel and consumption of goods and services. Tourism accounts for eight percent of global greenhouse gas emissions (Brief, 2019), and five percent global carbon dioxide emissions (Serrano-Bernardo et al., 2012). Trophy hunter travels for long distances to and from the hunting grounds because the majority of them live far from hunting destinations. As an example, most trophy hunters in Africa come from US and China.

Moreover, the trophy hunters need local transport at the destination, particularly, in developing countries where geographical sceneries are exceptionally challenging and necessitate them to drive for hours to search for animals with appropriate trophies. Since most greenhouse gases emissions are through energy consumption, the majority (74%) of the greenhouse gases is emitted by road transport. In that case, trophy hunters emit tailpipe greenhouse gases when hunting. Serrano-Bernardo et al. (2012) emphasized that hunters' mobility, mode of transport, total hunter's kilometrage travelled, days of trips and efficiency of travel equipment determine the energy consumptions and therefore the amount of greenhouse gases emissions. In addition, trophy hunters emit greenhouse gases through services and accommodation at the destination. The emission is due to the consumption of energy in the terms of heat and electricity in the accommodation facilities.

Furthermore, hunting camp produces and accumulate enormous waste in the hunting seasons. In the similar way, trophy hunters produce wastes during hunting expeditions. The recyclable and unrecyclable wastes produced need special waste management and disposal approaches as insufficient management and disposal consequently affect wildlife species. Biomass discarded by hunters significantly influence species population densities and dynamics, reproductive success, behavioral adaptations, movements and habitat utilisations (Cozzi, 2015). The wastes are poisonous to animals. Newsome and van Eeden (2017) assert that Resources Dispersion Hypothesis (RDH), spatial dispersion and accumulation of food normally determine species distribution and species richness in a certain area.

In that case, imbalance population of certain species increase in certain area, making it conspicuous and vulnerable to predators and poachers. also, unattended waste attracts animals and makes them highly dependent on waste. As a result, the animal loses its naturality and becomes unable to forage naturally. Mismanaged recyclable waste attracts many

animals to certain areas, thus increased human-wildlife conflicts and species aggregation. However, animals' activist unjustly blames trophy hunting for enormous production of waste; when other types of tourism activities such as mass tourism and ecotourism can produce more recyclable and unrecyclable wastes than trophy hunting. Furthermore, trophy hunting occurs seasonal while mass tourism and ecotourism occur throughout the year where the number of mass tourists and ecotourists exceed trophy hunters. Due to difference in the number of tourists and the seasonality of the activities, mass tourists and ecotourists produce more wastes than trophy hunting.

Trophy hunting is the main cause of intended and unintended overhunting. Sometimes overhunting occurs when unethical trophy hunters join hands with unethical wildlife manager or hunting operating companies to kill more animals than specified in the hunting permit or hunting quota while unintended overhunting results when conservation agency issues more hunting quotas than the actual number of individuals and species in the hunting block. It happens due to lack of sufficient information on species abundance and availability. Overhunting becomes more disastrous when the number of individuals killed exceeds the species reproductive rates (Cruise, 2019). It usually drives a population of frequently hunted species to the extinction (Bashqawi, 2014; Manley, 2018). As results, several species undergo extinction due to overhunting (UNEP, 2013). Currently, some species are close to extinction notch due to the overhunting caused by trophy hunting (Cruise, 2019).

In essence, overhunting has reduced the populations of African lion (*Panthera leo*) in Tanzania and Zimbabwe, and American cougars (*Felis concolor*) in America (CRS, 2019). It is important to note that, resident hunting, wildlife capturing, poaching, HWC and live animal trade also result in the overharvesting of wildlife resources by removing animals from their natural environment. If mismanaged, such harvesting

result in underpopulation of certain species and individuals. Poaching is the leading conservation challenge after HWC in Africa. Ivory poaching, for example, reduced significantly the population of African elephants (*Loxodonta africana*) from 800,000, in 1970s, to 86000 elephants, in 1990s (Advani, 2014). It equally reduced the population of black rhinoceros (*Diceros birconis*) from 60,000 in 1960s to 3000 in 2013. HWC have been reducing wildlife population by causing needless wildlife deaths (Graham et al., 2010; Granados, 2011). A recent study estimated the number of lions killed by humans, because of the human-carnivore conflicts, was directly proportional to number of livestock deaths in Serengeti ecosystem (Ontiri et al., 2018). Such killings are monotonous and attract urgent conservation attention because HWC usually kill animals unselectively regardless of their ages, rarity, sexes, involvements into incidents and their conservation status. Moreover, there are countless wildlife species and individuals confined within zoological gardens that are off natural ecosystems, and those involved in animals trafficking (Conover, 2010).

Also, trophy hunting, directly or indirectly, changes the behaviours of game and non-game species as it interferes with feeding, breeding and distribution patterns of the animals through shooting, chasing and disturbances (Thurfjell et al., 2012). Hunting intensifies HWC because the hunted species tend to abandon the hunting grounds for safer places to avoid deaths, disturbances and injuries from recreational hunters (Casas et al., 2009). When the fugitive species move to areas closer to human landscape may increase the incidents of HWC. Consequently, carnivores might attack domestic animals while herbivores might raid crops and annoy people. Besides, the abrupt change of native habitat might affect species genetic diversity, breeding, fecundity and mortality rates due to acquaintance to unfamiliar environment. Migratory birds as examples, fat deposition and storage are exceptionally important before distant migration.

Trophy hunting seriously affects fat deposition and storage in migrant birds because in trophy hunting season birds become more stress than offseason (Casas et al., 2009; Newsome and van Eeden, 2017). However, trophy hunting is not the only cause for animals to change their behaviours. Land use changes, climate change, poaching, HWC and photographing tourism might contribute to the change. Feeding of animals by photographing tourists make them highly dependent on artificial feed. Moreover, some animals abandon their feeding and breeding areas to avoid noises and disturbances from tourists or development projects. Some animals even change their structures and behaviors to avoid poaching. For example, some African elephants become tuskless to avoid ivory poaching. Some change their activeness into nocturnal or crepuscular to avoid poaching incidents at certain times of the day. In the similar manner, HWC change the feeding behaviors of some animals, as examples, habitual crop raiders become completely dependent on farmed crops because the crops taste more palatable, nutritious and digestible than grasses and trees.

6. Conclusion

This article reviewed relevancy and legitimacy of claimed consequences of trophy hunting on environment and socio-economic livelihoods. Some studies assert trophy hunting as both environmentally and socially constructive tourism enterprise if performed and managed accordingly. Also, trophy hunting can be severely destructive when mismanaged. These assertions are too general to fit all situations of trophy hunting. Trophy hunting can only be economically beneficial if the hunting destination possesses adequate wildlife resources, depends largely on the trophy hunting as main source of income and has well-articulated hunting and financial policies and regulations. Consequently, the socio-economic benefits differ significantly among hunting destinations. Developing countries get more economic benefits than developed countries, though, trophy hunting than developing countries because they have more technically

and precisely implemented in developed than developing countries due to well coordinate intersectoral communication and adequate and abundant managerial resources.

It is ecologically and economically sensible to reduce undesirable or overpopulated individuals from the population through trophy hunting which however, it depends on the type of species involved, criteria of species selection and trophy hunting timing. Trophy hunting is individually ineffective strategy for country problem unless it is integrated with another methods. In most cases, trophy hunting should be integrated with trapping and chemical methods to eradicate non-game species. Trophy hunting might only reduce individuals of certain species not all species, for examples, insects and birds are gregarious and extremely hard to control through hunting. Trophy hunting hardly controls problem animals because most game species are less destructive to human lives and properties than other culprits such as rodents and locusts. It is purely an exaggeration asserting that trophy hunting helps control problem animals when most of the frequently hunted species are irrelevantly destructive. In that case, trophy hunting targets the problem animals that are only economically beneficial not economically and socially disadvantageous. This makes trophy hunting inappropriate to HWC mitigation tool.

Environmentalists claim overhunting as one of the main causes of species extinctions, and of all, trophy hunting is the leading cause of overhunting. It is safe to acknowledge that trophy hunting is one of causes but it is neither the only nor the major cause of species extinction as resident hunting, live animal trade, subsistence, pest control and commercial poaching contribute largely to overharvesting and killing of animals more than trophy hunting. Both, legal and illegal hunting depopulate species whose fecundity rate is less than mortality rate. Unfortunately, there is no any published study to compare between the effects of trophy hunting and poaching. The opponents of trophy hunting are doubtful on trophy hunting because there are well documented data on the animals killed through

trophy hunting but they have unreliable data on poaching. It is important to note that what others call as trophy is actually a poaching. Studies define poaching as the hunting of animals in the unplanned areas, unspecified species, restricted firearm, off season, more than the number of animals specified. In that case, most of poaching activities are practiced in the style of trophy hunting. Therefore, trophy hunting hardly drives a certain species to extinction because the issuance of hunting quota depends on the number of species and individuals in the areas.

A purposefully killing of animals of certain age, sex or traits obviously affects the social, age and sex structures in the species population. The assertion from environmentalists is that owner of reserves authorizes the animals' killings thoughtlessly. It is important to remember that, the intention of trophy hunting is to kill animals selectively based on national and international laws, their qualities and features but not killing every animal in the reserve; unlike poaching and HWC that kill animals randomly without considering their ages, sexes, conservation status. When trophy hunting involves the killings of very old, bachelors, floaters and excess individuals, it trivially disrupts the population structure. It is obvious that trophy hunting emits less amount of carbon dioxide than ecotourism and manufacturing industries. Due to a smaller number of people involved, trophy hunting produces less recyclable and unrecyclable wastes than mass tourism and ecotourism. As example, 41 tons of wastes were collected from Yellow Stone National Park in 2004 season, 33 tons of tire wastes were collected in Serengeti National Park in 2010, and about 2 tons of wastes were collected from Mikumi National Park in a month (Nyahinga et al., 2016).

Moreover, the overhunting of wildlife resources due to trophy hunting might be less or equal to the wildlife overharvesting caused by poaching, wildlife trafficking and capturing of wildlife to supplement zoological gardens. In short, trophy hunting has never been as destructive as opponents claim. Most governments have well described policies and laws to regulate trophy

hunting operations. People often mix between trophy hunting and poaching. In that case, many opponents of trophy hunting confuse between poaching and trophy hunting because some poachers hunt under the shade of the valid trophy hunting licenses. If the world stopped trophy hunting operations today, most of the adversative impacts of trophy hunting, the opponents advocate would still be there. On that note, it safe to conclude that trophy hunting is not as harmful and advantageous as it is claimed to be, in other words, the consequences of trophy hunting are unreal but are exaggeration.

Acknowledgement

This article is based on literature review, and more precisely on informal discussion with historians and tourism experts in Tanzania. I'm indebted to the everyone who was involved in one or another way to make this article possible. I owe many thanks to my wife, Ms. Mida Abel Msamba, who initiated this great idea while lying in a hospital bed after surgery.

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