THE EFFECT OF MIGRATION ROUTE ON SUSTAINABILITY OF TOURISM DEVELOPMENT IN THE MARA-SERENGETI ECOSYSTEM: A TRANSBOUNDARY RESOURCE MANAGEMENT PERSPECTIVE

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ABSTRACT

Sustainable tourism development in the Serengeti-Mara region seemingly depends largely on the wildebeest migration phenomenon. Environmental management, resource use practices & other human activities on either side of the Kenya-Tanzania boundary have begun to alter the spectacular nature of the migration. The main objective of this study was to assess the effect of the wildebeest migration route on sustainability of tourism development. The study was guided by Tragedy of Commons Theory. A questionnaire was used to collect primary data from the field. A pilot survey at Lake Nakuru National Park was used to test reliability of the research instrument. Focused group discussion was also used. The research instrument was also subjected to scrutiny by subject matter experts to determine content validity. The target population for the study was 14983 individuals drawn from conservation agencies employees, business community and local community members. A strata sample size of 339 was adopted for the study. Qualitative and quantitative techniques was used which was analyzed using descriptive and inferential statistics. The study found that management of transboundary resources ensured sustainability of tourism development.

Key words: Wildebeest Migration Route, Sustainability of tourism development, Transboundary resource use, Mara-Serengeti Ecosystem

INTRODUCTION

Background to the study

Migration of animals is one of earth's dazzling biological phenomena. This eye-catching phenomenon has over the years attracted many scholars trying to understand how, why and when animals migrate. Long-distance migrations, where there is seasonal movements of animals between distinct areas which are not used at certain times of the year, used to happen or take place in many marine, fresh water and terrestrial taxa (Berger, 2004). Aggregate mammal migration which entails the seasonal and cyclic or oscilative movement of animals between certain distinct areas (Thirgood et al. 2004) is a unique phenomenon which attracts the attention of many, ranging from conservationists to tourists. Dingle & Drake (2007) observe that seasonal migration, where individuals make a return trip to and from physically separated home ranges to take advantage of variations in the biophysical conditions, is familiar among many taxonomic groups. Hebblewhite and Merrill (2007) note that the seasonal long distance movement is an adaptive response tactic that allows herbivores to avoid lack of food supply and perhaps diminish the risk of being fed on by predators. Harris et al (2009), who studied and mapped global aggregate migrations, have documented thus:

> *Twenty-four large mammal species (and subspecies) are known to migrate or to have migrated in aggregations—all ungulates. Mass migrations for 6 of these are extinct or their status unknown: springbok Antidorcas marsupialis, black wildebeest Connochaetes gnou, blesbok Damaliscus dorcas, kulan Equus hemionus, scimitar horned oryx Oryx dammah, quagga Equus quagga. Most migratory populations lack reports on their numbers, distances traveled, geographical routes, ecological drivers and threats. Where data exist, they are often over a decade old.*

According to these authors, most of these aggregate migrantions have occurred or occur in Africa, where there are nine (9) enduring migrants occurring in six (6) areas namely Boma-Jonglei, Sudan; Mara-Serengeti ecosystem of Kenya and Tanzania; Tarangire in Tanzania; Liuwa between Zambia and Angola; Chobe and Kalihari in Botswana and; (Harris et al, 2009). Elsewhere in the world, there is also reported or documented six (6) combined wanerers left over for Eurasia, and four (4) for North America where the caribou or reindeer (*Rangifer tarandus)* occur in both.

Some of the known examples of long distance migrations and which are among the most stunning natural occurrence or event include the long-distance recurrent movements of monarch butterflies *Danaus plexippus* in Northern American continent, the wildebeest *Connochaetes taurinus* in the Mara-Serengeti ecosystem, pallian birds athwart the Americas, and grey *Eschrichtius robustus* and humpback whales *Megaptera novaeangliae* in the Pacific Ocean (Wilcove, 2009).

In the Serengeti ecosystem for example, much effort has been directed at understanding how, when and why the wildebeest migrate. Majority of the longitudinal studies/surveys have used natural scientific experiment method in the field to study movement of collared animals using Global Positioning System (GPS) telemetry and aerial images. Other studies on the migration phenomenon need to be done. For this study, focus was on the effect of the migration route on sustainability of tourism development. The interrogation was focused on how the variation of phenomenal element or component of wildebeest migration, namely the migration route affect sustainability of tourism development. Migration route refers to the exact path or corridor followed by animals when on the move. This feature of the migration phenomenon may vary depending on resource use, management practices, human activities and changes in the environment. The variations in the migration route will also have implications in the sustainability of tourism development.

Transboundary Resources in the East African Community

The East African Community (EAC) is a regional block made up by six partners in the African Great Lakes region namely, Kenya, Rwanda, Burundi, Uganda, Tanzania and Southern Sudan. Cooperation among the member states is currently focused on customs union, common market, monetary union and political federation(Reith and Boltz, 2011). These states share many earthly

and water ecosystems which are viewed as resources and a stock up of wealth for the economies of these countries. They include, but not limited to, wildlife (flora and fauna) and rich mineral reserves which if well put into use, could positively impact on the welfare of the community and alleviate poverty. It is noted that the above mentioned shared ecosystems are facing major threats, including depletion of natural resources due to ever increasing anthropogenic pressure manifested in ballooning anthropocentric developments resulting in overutilization, untenable agricultural practices, overharvesting of wildlife resources such as fish, dumping of wastes affecting both on site and off site sources and sink capacities, uncontrolled reclamation and eventual damage of wetlands and ecosystems in and around sensitive places such as Lake Victoria
and
other set aside areas such as the MSE. If this is not addressed on time, these threats may result in momentous negative ecological, economic and social impacts.

Even though much is being done to appraise the policy to Environment and Natural Resource Management was signed by the Republics of Kenya, Uganda and United Republic of Tanzania on 3rd April 2006. The Protocol has since been ratified by the Republic of Uganda and the Republic of Kenya in 2010 and 2011 respectively. However, the United Republic of Tanzania is dragging her feet in ratifying the Protocol with reasons best known to them. The process to address their issues in order to finalize the ratification process and make the Protocol operational is still ongoing under the guidance of the Council of Ministers. The Republic of Rwanda, the Republic of Burundi, Southern Sudan and DRC Congo were not yet EAC Partner States at the time the Protocol was negotiated and signed. Furthermore, the Protocol is at present not in operation and hence not a lawfully binding document until it is ratified by all Partner States including new entrants.

Statement of the problem

The wildebeest migration route at the Mara-Serengeti ecosystem (MSE) has been declared by UNESCO one of the new wonders of the world. This phenomenon attracts tourists for wildlife resources in the Mara and Serengeti ecosystem have led to development of tourism and growth of tourism business in MSE area over the years. For the tourism development to thrive and be sustainable in the MSE, the ecosystem has to retain its self-perpetuating status unaltered and its wildlife-based tourism product has to persist, particularly the wildebeest migration phenomenon. In recent times the phenomenon has been, and continues to be used as a flagship marketing tool for the Masai Mara National Reserve & Serengeti National Park tourism & business.

In the ideal situation, it is expected that the physical natural environment of the MSE will be sustained, the tourism development and growth will continue positively in terms of profitability & provision of jobs and livelihoods of the local people maintained as long as the spectacular

nature of this migration phenomenon persists. However, the continuity of the ecosystem and persistence of this wildlife product (wildebeest migration phenomenon) has not been cross-examined. The Mara-Serengeti ecosystem experiences diverse and conflicting interests from different stakeholders surrounding the Mara and the Serengeti (Thirgood et al 2004).

Mara-Serengeti is a common property ecosystem shared between two governments and their respective surrounding communities. Due to conflicting interests and conflicting resource use policies, it has been described as, and is regarded as an ecosystem under siege (Mukeka, 2019 & Waithaka, 2004). Its wildlife resources are likely to suffer a tragedy as a result of wanton use and destruction minding only on gains without much care on the resulting negative environmental and socioeconomic impacts (Frischmann et al, 2019; Katerere et al, 2001). The ecosystem is facing enormous threats from a ballooning and burgeoning human population with higher poverty levels, conflicting land tenure systems on either side of the border, land subdivisions, fencing, fragmentation and destruction of habitats, changing of land use from livestock keeping (nomadic pastoralism) to crop farming, Sedentarisation (settlement) and growth of market centers. All these anthropocentric processes are leading to blocking of wild game migratory routes and corridors, range contraction, heightened poaching and general degradation of the environment (Ogutu et al 2012; Estes et al 2012; Fyumagwa et al, 2013), which is further worsened by the processes of climate change.

Furthermore, it has been observed that similar/related spectacular Long Distance Migration of animals elsewhere has been truncated due to similar anthropogenic issues beginning to impact the MSE. For instance, Wikelski & Wilcove (2008) and Dobson et al., (2010) ascertain that the phenomenon across many animal species and in many parts of the planet has been truncated or is under threat from anthropogenic pressures resulting in habitat destruction, causing barriers to movement, resource depletion and climate change. Bolger et al., (2008) and Harris et al., (2009) further observe that this phenomenon has collapsed in many areas because of transformations in land use and anthropocentric developments. Therefore, this study assessed migration routes on sustainability of tourism development in the MSE.

Objectives of the study

The objective of the study was to assess the role of the wildebeest migration routes on sustainability of tourism development in the Maasai Mara & Serengeti ecosystem a transboundaryperspective.

THEORETICAL REVIEW

Common Property and the Tragedy of the Commons Theory

This was adopted as the over-riding (main) theory guiding the study. This is because the theory addresses issues which arise from the use of shared or common resources. Wildebeest at the

MSE is a common transboundary wildlife resource which moves to and from Kenya and Tanzania making use grazing ranges on either side of the boundary at different seasons.

The "common property and the tragedy of the commons" theory was proposed by Garrett Hardin in 1968 by drawing from biological and economic theories (Frischmann, 2019). Earlier on in 1960, in his article 'The Complete Exclusion', Hardin had postulated that 'complete competition cannot coexist' (Frischmann, 2019; Oakes 2016). He advanced an argument which can be explained that if two actors occupying a given geographical area and influencing ecological processes in the same ecosystem but differing in their processes & actions policies such as resource allocation, resource ownership, resource use, resource conservation etc, one or both of them will suffer a tragedy as a result of their differing ways of actions and activities in the ecosystem (Frischmann, 2019). Either of the two actors will try to vary and tailor resource use policies to their own advantage at the expense of the other. Riding on this earlier work in 1960, Hardin, later in 1968, came up with the common property and "the tragedy of the commons" theory which advances an argument which can be summed up that resources that are communally, commonly or publicly owned, such as rivers, lakes, oceans, and free range grazing lands, and therefore whose use is not privately or government controlled, are vulnerable to unsustainable utilization because individual resource users are focused at gaining the full benefits of using the resource but only bear a portion of the costs of unsustainable use (Frischmann, 2019; Boyd, 2018). Regarding these commonly owned resources, and adding voice to Hardin's theory, Katerere et al. (2001) postulate that utilization by entities acting reasonably will continue to use the resource even if the combined rate of resource use is unsustainable. As proposed by Hardins (1968), the common property and tragedy of the commons theory advances two arguments, one that commonly or communally owned and exploited resources will eventually suffer a tragedy and end up in tragic ruin; and two, to avoid the tragedy & tragic ruin the use of such resources require either privatization (by assigning private property rights through allocation and granting access & use rights to allow efficient resource use and management over time) or government occupying the area with the resources to own it and impose limits or control in their use (Frischmann, 2019; Boyd, 2018). Hardin further adds a third recommendation of government control of human population growth by recognizing the stress that human populations increase placed on finite environmental resources in a finite world, arguing that freedom to breed will bring ruin to all (Ostrom 2007).

Katerere et al. (2001) note that as is the case with resources which are communally owned, natural resources which straddle global borders can also be categorized as commons because consumers on one side of the border are not able to control use or impacts caused by fellow users and stakeholders on the other side of a boundary. These authors go on to observe that ordinary resources such as fauna or animal populations are also communal across borders because of [their] wandering behaviour and other distinctiveness. They further hold that even resources that

are immobile such as forests must often be considered as transboundary if they have habitually been accessed by cross-border communities.

In applying Hardin's 'commons' analogy in the Mara and Serengeti, the wildebeest qualify in every respect as a transboundary wildlife resource because of their migratory behavior. These ungulates migrate from the Serengeti National Park on the Tanzanian side, crossing the boundary into the Maasai Mara National Reserve on the Kenyan side. Use, management and the impact thereof on the Kenyan side of the international border cannot be controlled by users, managers and the impact thereof on the Tanzanian side. Each side of the divide is interested in reaping the full benefits of this resource while on their territory and less concerned with the impact of their actions on the other side of the border. Land-use practices by humans and other human activities also affect the migration but this activities and use are not uniform on either side of the border. The continued unsustainable use, practices and activities on both sides of the boundary may finally truncate the migration phenomenon, a tragedy that will affect the ecological and socio-economic systems and processes on both countries thereby negatively impacting on tourism development in the region. This makes Hardin's theory relevant in trying to address the likely eventuality if action is not taken to ensure sustainable use and continuity of the wildlife resources of the Mara-Serengeti ecosystem.

However, Goldman (1998) observes that "in reality, Hardin's theory does not comprehensively reflect the diversity & complexity of human use of the environment, and overuse of the commons and eventual tragic ruin may or may not occur in particular circumstances depending on numerous social and other factors". For example, in some cases local common property can be successfully managed by local commons without regulation by central authority or privatization as demonstrated by Ostrom (2016). In addition, commons governance or government control works in some contexts and fails in others as observed by Ostrom (2005). This results from the fact that community governance or local institutions are often embedded in central government, and most of the time these institutions depend on each other in order to realize success (Ostrom 2010).

Furthermore, the matter is more complicated in a case of a transboundary resource in which two different governments are involved as is the case under study – the Mara and Serengeti ecosystem. The Tanzanian government has its own policies on the Serengeti which differ greatly from Kenyan government policies on the Mara e.g. Tanzania allows settlement, farming, hunting & harvesting of wildlife, while Kenya allows tourism as the only acceptable use (Thirgood et al 2004). Hardin's analogy considers a very simplified scenario which cannot be used to address issues in a very diverse and complex system. In his analogy, Hardin looks at a resource as a mutually exclusive, fixed, finite or static and stationery item ignoring other processes & players e.g. other dynamic and often complex processes and alternative resources in the mix which influence exploitation and use of the former i.e. the interdependence aspect collective goods or

resources and processes in the system is ignored in Hardin's analogy (Marciano & Medema 2015; Frischmann 2012; Ostrom 2010).

The wildlife resource under study is highly ubiquitous making use of food resources at extreme ends of the migratory range, and highly productive, replenishing stocks. The other undoing of Hardin's analogy is the assumption of the possibility that people will communicate in controlling and managing use of commonly owned resources (Ostrom 2007). However, to prevent one side of the divide from disadvantaging the other, it calls for cooperation and negotiation for harmonized policies and processes, putting in place restrictions acceptable on both sides reminiscent of tariffs and trade barriers of international trade (Frischmann 2019). Though, the much needed cooperation is sometimes elusive and often replaced with political rhetoric, lacking real commitment to positive action on the ground.

Even though there is some logic in the argument that freedom to breed will bring ruin to all, the recommendation for government control to population growth may not do much as the right to determine the size of families does not lie with the government (Ostrom 2010). However, with increased and ever growing human population compounded with advancement in technology leading to improved ability to harvest and use resources, the fact that common property resources have in many cases been overexploited cannot be contested. Lastly, the privatization advocated by Hardin regarding the commons will face challenges in assigning property rights, and then soon after followed by overexploitation, overcrowding due to lack of self control, disappearance due to premature exhaustion or extinction (Frischmann 2019). It is due to the aforementioned deficiencies of the 'tragedy of the commons' theory that guided the researcher to suggest and explore the **Rational Choice Theory** (RCT) to supplement it and closely backed with the concept of **Political ecology** in explaining and addressing issues regarding sustainable development and use of commonly owned resources.

EMPIRICAL LITERATURE REVIEW

Migration route

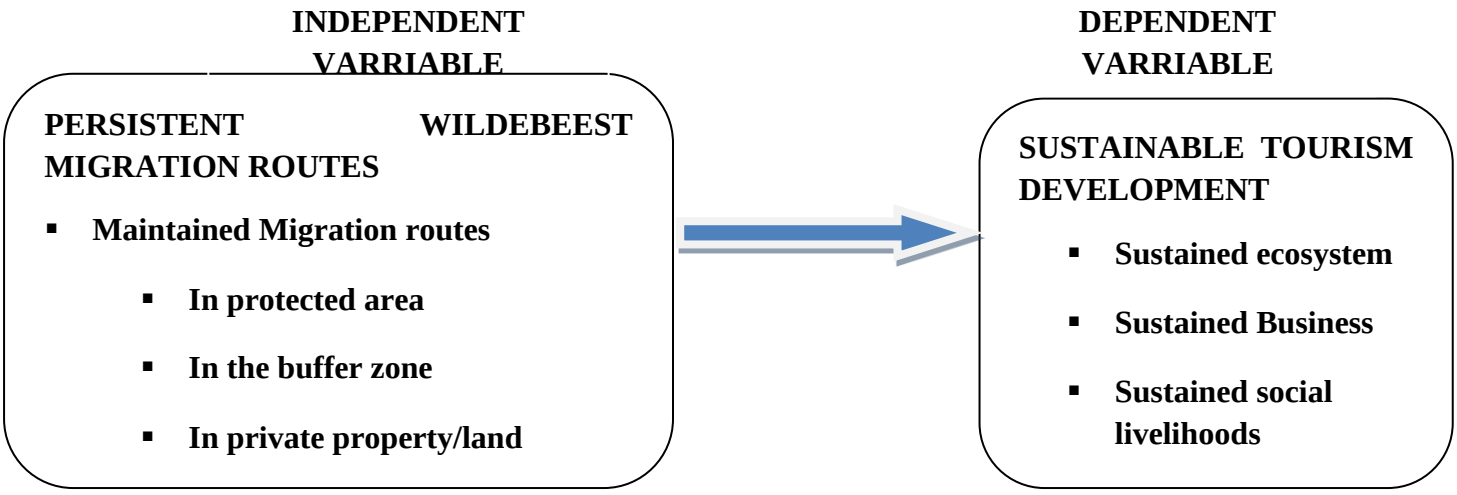
In their research in 2004 entitled *"Can parks protect migratory ungu- lates? The case of the Serengeti wildebeest",* where they studied the movement of the itinerant wildebeest, *Connochaetes taurinus,* in the expansive 25000 km^2 Mara-Serengeti ecosystem of Kenya and Tanzania by considering status of protected area in diverse parts of the system, Thirgood et al (2004) observe that "conservation of migratory species can be problematic because of their requirements for large protected areas". In their study, these researchers found out that two "sections of the wildebeest migration route – the Ikoma Open Area and the Mara Group Ranches – currently receive limited protection and are threatened by poaching or agriculture. In their Comparison of current wildebeest migration routes to those recorded during 1970s, they got an

idication that the western buffer zones appear to be used more extensively than in the past". They tentatively concluded that the shift in the routes used 'has imperative implications for management and needs additional study' in order to produce comprehensive knowledge of movement of migrant species to guide helpful conservation action, which would also have implications in tourism development.

Other studies like those of Homewood (2001) titled "Long-term changes in Serengeti-Mara wildebeest and land cover: pastoralism, population, or policies?" and Serneels & Lambin, (2001) titled "Impact of land-use changes on wildebeest migration in the northern part of the Mara-Serengeti ecosystem" found out that key migratory routes of the Mara-Serengeti ecosystem lie outside the protected sections or within partially protected areas. It is here that the wildebeest encounter numerous threats some of which come from intensified agricultural activities e.g. to the north of the Maasai Mara National Reserve and to the western boundary of the Serengeti National Park. This is due to increased human population around the ecosystem growing with a tempo of 5% per annum (Thirgood et al 2004). For migration route, refer to fifure 1 in appendix 1.

Conceptual Framework

A field study to establish a relationship between the thematic area of the migration routes and sustainability of tourism development was conceptually proposed as shown in the Conceptual framework below:



RESEARCH METHODOLOGY

This study the study adopted a mixed method approach where both quantitative and qualitative techniques were utilized to collect information from respondents. The protected parts of the MSE are: the Mara Ranches (MR) to the north, Maswa Game Reserve (MGR), Grumeti Game

Reserve (GGR) and Ikorongo Game Reserve (IGR) to the southwest, Ngorongoro Conservation Area (NCA) and Loliondo Game Controlled Area (LGCA) to the southeast.
Stratified random sampling technique was used to increase precision and presentation (Kothari, 2004). From a target population of 14983, a sample of 339 respondents was selected.

RESULTS AND FINDINGS

Response Rate

Out of 339 questionnaires distributed in the field, 248 were completed and returned. 91 questionnaires were not returned. The response rate in this case was 73.2% indicating that respondents were willing to take part in the study and which is good enough for this study. The response rate results are tabulated below :

Table 1 questionnaire return rate

	Frequency	Percentage
Distributed	339	100
Returned	248	73.2
Unreturned	91	26.8
Non usable	16	4.7
Usable	232	68.4

Source: Field data (2021)

Respondent Category

Table 1 Respondent Category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Resident of Serengeti-Mara	33	14.2	14.2	14.2
	Employee of business facility	13	5.6	5.6	19.8
	Tourist/Visitor to the Serengeti-Mara	173	74.6	74.6	94.4
	Conservation Agent	13	5.6	5.6	100.0
	Total	232	100.0	100.0	

Source: Field data 2021

It was also important to capture information on category of respondent. This was on the place of residence and employment. Majority of the respondents happened to be visitors/tourists to the MSE standing at 74.6%. Residents of the MSE formed only 14.2% of the respondents while employees' category constituted 11.2%. Important information on variations over time could verified from such categorization.

Wildebeest Migration Route on Sustainability of Tourism Development in the Mara-Serengeti ecosystem.

The specific objective was to assess the effect of the wildebeest migration route on sustainability of tourism development in the Mara-Serengeti ecosystem. Tourism development in the MSE would be sustainable if the migration route will remain or persist in its original, favorable and ideal state without experiencing any variations in any of its aspects such as its location or position. As one of the features of the wildebeest migration phenomenon, the research sought to find out if Wildebeest Migration Route is experiencing any variations and by extension affecting tourism development and sustainability in the region. A number of statements were assessed and ranked on a five-point Likert Scale by respondents to indicate characteristics of, and the extent to which the wildebeest migration route as one of the migration phenomenon features has varied or changed over time.

Table 2 Descriptive Statistics for Migratory Route

	N	Minimum	Maximum	Mean	Std. Deviation
One original migratory route	232	1	5	3.41	1.424
Several migratory routes	232	1	5	2.88	1.322
Migratory routes have merged	232	1	5	3.04	1.343
Migratory route in Protected Area	232	1	5	3.59	.985
Migratory route in buffer zone	232	1	5	3.51	.962
Original migratory route has not changed	232	1	5	2.28	1.324
Migratory route has shifted from initial path	232	1	5	3.52	1.316
Migratory route changed due to natural changes in the physical environment	232	1	5	3.46	1.158
Valid N (listwise)	232				

Source: Field data (2021)

The research found out that the migratory route lies astride the protected area and the privately or communally owned places, with a buffer zone sandwiched in between the two areas. This can be seen from the (M=3.59; SD=0.985 for those who indicated that the wildebeest migratory route is in the protected area. It was also found out that part of the wildebeest migratory route falls in the privately owned and communally owned land (with a (M3.45; SD=1.047). Part of the wildebeest migratory route lies in between these two areas, an area referred to as the buffer zone. This had a (M=3.51; SD=0.962. As observed by Homewood et al., (2001) and Serneels & Lambin, (2001), this positioning of routes gives a situation where key migratory routes of the Mara-Serengeti

ecosystem lie outside the protected sections or within partially protected areas. It is here that the wildebeest encounter numerous threats some of which come from intensified agricultural activities e.g. to the north of the Masai Mara National Reserve and to the western boundary of the Serengeti National Park. This is as a result of increased human population around the ecosystem growing at a rate of 5% per year (Thirgood et al 2004).

While focusing on the wildebeest migration route as an important feature of the migration phenomenon, the research also sought to find out if there have been any variations in the migratory route especially in its original location and status as compared to its current location 7410and status. While respondents indicated that they were not sure if there used to be several routes in the past and if there used to be only one original migratory route, with (M=2.88; SD=1.322) and M=3.41; SD=1.424) respectively, it was found out that the wildebeest migratory route has shifted from its original initial path as indicated by the (M=3.52; SD=1.316). This is also confirmed with a disagreement by respondents on a statement that the original migratory route has not changed as indicated by (M=2.28; SD=1.324). This is consistent with the works of Thirgood et al (2004) who also indicated that the shift in the routes used 'has important repercussions for management and needs further study' in order to produce detailed knowledge of movement of migratory species to guide effective conservation action and also to find out what repercussions this could have in tourism development.

More importantly, the research also sought to find out the causes of variations in the migratory route feature of the great wildebeest migration phenomenon. It was found out that two major categories of factors have contributed to the occurring variations. One category is that of natural changes in the natural physical environment. This is indicated by the (M=3.46; SD=1.158).

The natural changes could be as a result of vegetation succession processes along the migratory corridors. The vegetation succession process is influenced by the movement of large number of animals leading to trampling on and breaking the soil making way for germination of plant seeds resulting in trees and bushes. The resulting trees and bushes make movement of the migrating community difficult, replace grazing grounds and shelter and hide carnivores from the view of the ungulates. The wildebeests will naturally change route to avoid such terrains and to avoid carnivore ambush points (as per a narration from focus group discussion).

Another cause of natural changes could be climate change. This factor has brought changes along the migratory route that has caused variations to this feature of the migration phenomenon. For example, at the iconic river crossings where there is the encounter between the migrating community and the crocodiles, the ungulates have learnt to cross at areas where there is reduced volume of water to avoid crocodile attacks. The reduced water volumes are due to variability in rainfall patterns and drier wet seasons and extended or prolonged droughts (Dore, 2005;

Fyumagwa et al. 2013; Walling, 2007). This has made the encounter less spectacular and is thus no longer attractive to the visitors as previously used to be.

An equally important factor that has caused variations in the migratory route of the wildebeests and the accompanying migratory community is the human factor. This is due to the Serengeti-Mara resource use policies as noted in the work of Homewood et al (2001) and Woien & Lama, (1999) detailing what is allowed in the ecosystem. Research results indicate that human activities have contributed to shifts (variations) in the migratory route feature. This is indicated by (M=3.99;SD=1.197). Some of the human activities which have contributed to variation in the wildebeest migratory route are such as use of prescribed fires in the managing of the savanna grassland vegetation (the grasses) a case where dry grasses are set on fire to give way to new fresh grass growth for livestock and also to control pests such as ticks. These prescribed fires are also used in the protected areas by government conservation agencies for the same purpose. Unfortunately the fires end up with an unintended result of repulsing or obstructing the movement of the wildebeest and other animals in the migrating community.

Another human activity which has led to variations in the migration route feature is the fencing off of private land. This is governed by the land tenure system in place. On the Kenyan side of the MSE, there is provision for private ownership of land. Land owners have preferred setting aside pasture for their livestock as opposed to sharing their grounds with wild animals. Farmers have fenced their parcels obstructing wildebeest migratory routes hampering animals' movement. This has most of the time heightened wildlife-human conflict. For example, some of the traditional wildebeest maternity grounds at the Loita plains have been taken and fenced off by private land owners (see picture from the field below).

Figure 1 An electric fence on a private property to block animals

Source: Researcher Field data (2021)

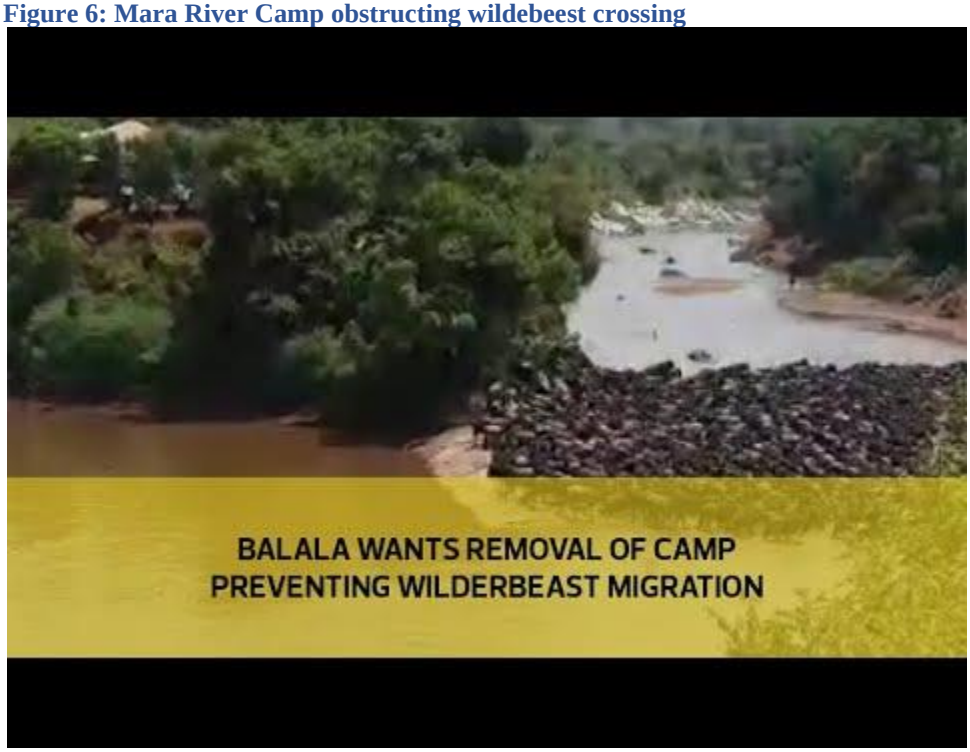
Though, some of the land owners have pooled their parcels of land together to form conservancies to participate in wildlife conservation activities with the aim of benefiting from tourism. Other local land owners leave their parcels unfenced with an argument that the wildebeests act as a buffer for their livestock against carnivores. Another human activity that contributes to variations in the migratory route is the development of physical features along and across the wildebeest migratory routes. The developments are such as construction of roads to enable movement and traversing across the MSE landscape by both locals and tourists. Some proposed road projects are yet to be implemented (Fyumagwa, 2013; Dobson, 2010).

Another physical development across the landscape is the construction of hospitality facilities and putting up of fences around them, a development which ends up obstructing migratory routes and distracting movement of the migrating wildebeest and other members of the migrating community. Hospitality facilities are built closer to migratory routes so as to give visitors the best opportunity to view and witness the migration spectacle at a closer range. This is backed up by findings from the field where the research sought to find out if the wildebeest migratory route

influenced the choice of location of business. The result returned a positive relationship as indicated by a (M=4.08; SD=1.214). At least this is the intended result; that of giving the visitors an optimum experience. The unfortunate outcome is the accompanying obstruction and eventual distraction of the migrating community, causing the animals to change or look for an alternative route. Below is a picture of an example of a restaurant along the Mara River obstructing a river crossing (more details are given in the appendix 5 in the appendices section):

> *The owners of the camp that was ordered to be demolished after causing deaths of wildlife know that they engaged NEMA, EIA, national tourism board and the Narok County government in the entire corrupt and illegal establishment of the structure and that's why they have not bothered listening to the orders of the Tourism Cabinet Secretary.*

Figure 6: Mara River Camp obstructing wildebeest crossing



Source: Opera News Hub Creator 13/09/2020

Where the obstruction is repetitive over the landscape and distraction unbearable to the animals, forward movement of the migrating community is hampered and this may over time lead to contraction of the migration range and eventually truncate the phenomenon (Ogutu et al. 2011).

Other human activities that have either directly or indirectly contributed to variations on the wildebeest migratory route include the farming activities upstream along the Mara River basin and human activities at the Mau water Tower where the Mara River originates. The Mara River is the source of life of the MSE and the site for spectacular encounters between crocodiles and wildebeests which are witnessed at iconic crossings at the Mara River. This is where tourists are treated to spectacles during the wildebeest migration season. Due to human activities over the

years, compounded with the impacts of climate change, water volumes of the Mara River have gradually reduced. Some sections of the river valley in the MSE end up with low volume of water and animals change their route to cross at such sections. This has altered the nature of the spectacles at river crossings as there is less ambush from crocodiles and other carnivores at such less spectacular river crossings (insert pictures of dry river valleys as an illustration).

From the foregoing findings, it can be thus far said that the best indicator of the migratory route variations is the human activities & interventions factor with the highest mean (M=3.99; SD=1.197). If the interventions and development activities are eliminated, the migratory route can be maintained and retained at its original ideal and favorable state to ensure a persistent wildebeest migration phenomenon.

Sustainable Tourism Development

To crosscheck on the results in the objective above, the researcher sought to find out the extent of dependence of the three attributes of the dependent variable (sustainable tourism development) on the migration route. The three attributes considered in this study included tourism business, livelihoods of the local people and environmental/ecosystem sustainability. In this case, it was also assumed that tourism development in the MSE would be sustainable if the tourism businesses and people's livelihoods would continue thriving, and that the ecosystem would remain or persist in its original, favorable and ideal state, without experiencing any variations due to alterations in the migration phenomenon. The research therefore sought to find out if there is any influence of the migration phenomenon on the above mentioned attributes of sustainable development. A number of statements were assessed and ranked on a five-point Likert Scale by respondents to indicate characteristics of, and the extent to which the migration phenomenon influences the said three attributes of sustainable development in the Mara and Serengeti ecosystem.

Tourism Business

Regarding tourism businesses in the MSE, the research sought to know if choice of location and performance have depended or been influenced by the migration phenomenon. Further, the research sought to know if variations in the migration phenomenon have affected businesses in any way. The table below gives a summary of the findings:

Table 3 Descriptive Statistics of influence of migration routes on tourism business

	N	Minimum	Maximum	Mean	Std. Deviation
Migration route influenced choice of location of business	232	1	5	4.08	1.214
Migration pattern influenced choice of location of business	232	1	5	4.00	1.087
Migrating numbers sighted influenced choice of location of business	232	1	5	3.81	1.334
Migrating community composition influenced choice of location of business	232	1	5	3.82	1.113
Choice of location of business was never influenced by any of the features of the migration phenomenon	232	1	5	2.08	1.254
Business performance has depended more on the migration phenomenon	232	1	5	3.85	1.157
Business performance has depended less on the migration phenomenon	232	1	5	2.38	1.106
Deterioration on the migration phenomenon has led to decline in performance of business	232	1	5	3.64	1.064
Businesses have downsized due to changes in the migration phenomenon	232	1	5	3.44	1.035
Changes in the migration phenomenon have no significant changes in business perfomance	232	1	5	2.03	1.279
Valid N (listwise)	232				

Source: Field data (2021)

The research results indicate that all the four features of the migration phenomenon considered in the study influence location of tourism business, but migration route is the best indicator in influencing the choice and location of business (M=4.08; SD=1.214). Tourism business facilities such as hospitality facilities (hotels, lodges, tented camps and camp sites etc.) are built or set closer to migratory routes so as to give visitors the best opportunity to view and witness the migration spectacle at a closer range. Migration pattern come in as the second best indicator of choice and location of tourism business (M=4.00; SD=1.087). Migration pattern is controlled by the sliding gradient of availability of resources (fresh vegetation- grasses & rain- water) for the migrating animals. Migrating numbers and migrating community composition come at the bottom after the above two in their influence on the choice of location of business (M=3.81; SD=1.334 and M=3.82; SD=1.113) respectively. The sighting of a million animals at a go and the variety of species involved, together with ambushes from carnivores is more pleasing and attractive to tourists. If such characteristics of the phenomenon deteriorate, the experience also deteriorates and thus becomes less spectacular and less attractive to the visitors. The research also strived to find out if business performance is influenced in any way by, or depends on the migration phenomenon. It was found that business performance depends more and more on the migration phenomenon (M=3.85; SD=1.157). This outcome is corroborated with the negation to the statement that ‘tourism business performance has depended less on the migration

phenomenon' (M=2.38; SD=1.106). Further to the foregoing findings, it is confirmed that there has been observed a decline in performance of tourism business due to deterioration of the migration phenomenon over time (M=3.64; SD=1.064). This finding is also corroborated with the negation to the statement that 'changes in the migration phenomenon have no significant changes in business performance (M=2.03; SD=1.279). These findings put together with the findings indicating variations/alterations of the individual features of the migration phenomenon would point to a situation where tourism business development is not sustainable.

Livelihoods of the Local People

Regarding livelihoods of the local people in and around the MSE, the research sought to know if they have depended, been influenced or affected by the migration phenomenon. Further, the research sought to know if variations in the migration phenomenon have affected livelihood opportunities in any way. The table below gives a summary of the findings:

Table 4 Descriptive Statistics of migration routes influence on livelihoods of the local people

	N	Minimum	Maximum	Mean	Std. Deviation
Migratory route has been and continues to be economically beneficial to the locals	232	1	5	3.66	1.444
Migratory pattern has been and continues to be economically beneficial to the locals	232	1	5	3.92	1.160
Migratory population has been and continues to be economically beneficial to the locals	232	1	5	3.79	1.229
Migrating community composition has been and continues to be economically beneficial to the locals	232	1	5	3.94	1.170
Locals have benefited more from the migration phenomenon	232	1	5	3.69	1.202
Locals have been disadvantaged more by the wildebeest migration phenomenon	232	1	5	2.70	1.126
Locals' business opportunities have grown over time	232	1	5	3.59	1.078
Locals' business opportunities have reduced over time	232	1	5	2.72	1.017
Locals' business opportunities have remained unchanged over time	232	1	5	2.25	1.027
There is no relationship between the migration phenomenon and the local people's livelihoods	232	1	5	1.99	1.252
Valid N (listwise)	232				

Source: Field data (2021)

The research results indicate that all the four features of the migration phenomenon considered in the study influence local people's livelihoods. Of the four features, migrating community composition is the best indicator in influencing the said livelihoods. Research found out that

migrating community composition has been, and continues to be economically beneficial to locals (M=3.94, SD=1.170). This is more so to those operating businesses and those employed in the various facilities in and around the MSE. Tourism business facilities such as hospitality facilities (hotels, lodges, tented camps and camp sites etc.) are built or set closer to migratory corridors/routes where we would have large concentrations of the migrating animals. This is meant to give visitors the best opportunity to view and witness the migration spectacle at a closer range. With persistent and more spectacular herds, the experience is more pleasing, attracting more visitors consistently. This means more business and ensured job opportunities. Migration pattern come in as the second best feature in influencing the livelihoods of the local people (M=3.92; SD=1.160). Migration pattern is controlled by the sliding gradient of availability of resources (fresh vegetation- grasses & rain- water) for the migrating animals. Migration pattern looks at the season and timing of the arrival and departure of the migrating herds. This also helps in determining the high/ peak season and low season of business and accompanying benefits to the local people. Migrating numbers and migration route come at the bottom after the above two in their influence on the livelihoods of the local people. The results indicate that the migrating population numbers and the migratory route also have been, and continue to be of benefit to the local people (M=3.79; SD=1.229 and M=3.66, SD=1.444) respectively.

Further results from the research indicate that local people have benefited more from the migration phenomenon (M=3.69; SD=1.202) as opposed to its disadvantages (M=2.70; SD=1.126). Among the benefits which come with the phenomenon include the business opportunities from tourism and the buffering of livestock from carnivores where carnivores will prefer preying on the wildebeests to local people's livestock. The disadvantages include competition for resources (water, pastures & space) and spread of diseases from wildlife to locals' livestock. Perhaps the most important finding in the livelihoods attribute is the finding that there is relationship between the migration phenomenon and the livelihoods of the locals. This is confirmed by the negation to the statement that 'there is no relationship between the phenomenon and the local people's livelihoods' (M=1.99; SD=1.252). While business opportunities grew over time, thanks to the wildebeest migration phenomenon (M=3.59, SD=1.078), the growth has not been sustained as there has also occurred a change to this growth. This has been indicated by the negation to the statement that 'locals' business opportunities have remained unchanged over time (M=2.25, SD=1.027). Though, a study needs to be done specifically to establish the kind of change to business opportunities because respondents were not sure if there has been a decline in the said opportunities (M=2.72, SD=1.017).

Environmental Sustainability

Lastly, the research sought to establish if the migration phenomenon plays any role in influencing environmental sustainability in the larger MSE. All the four features of the migration phenomenon i.e. migration route, migration pattern, migration population numbers and migrating

community composition together with the control variable (resource use & management practices) were considered. Respondents were asked to assess and rank given statements regarding the phenomenon and environmental sustainability. Results are tabulated below:

Table 5 Descriptive statistics of migration routes influence on environment/ecosystem

	N	Minimum	Maximum	Mean	Std. Deviation
Migration route influences environmental sustainability	232	1	5	3.43	1.375
Migration pattern influences environmental sustainability	232	1	5	3.75	1.138
Migrating numbers influences environmental sustainability	232	1	5	3.63	1.170
Migrating community composition influences environmental sustainability	232	1	5	3.55	1.119
Resource use & Management practices at the MSE affects environmental sustainability	232	1	5	3.83	1.179
Migration route has no influence on environmental sustainability	232	1	5	2.47	1.135
Migration pattern has no influence on environmental sustainability	232	1	5	2.36	1.161
Migrating numbers has no influence on environmental sustainability	232	1	5	2.35	1.164
Migrating community composition has no influence on environmental sustainability	232	1	5	2.50	1.057
Resource use & Management practices have no influence on environmental sustainability	232	1	5	2.11	1.274
Valid N (listwise)	232				

Source: Field data (2021)

Resource use & management practices (the Control Variable) stood out to be the best indicator among environmental sustainability influencers (M=3.83, SD=1.179). These include the uses & management practices which lead to variations in the features of the migration phenomenon. Resource use policies such as land tenure policies and wildlife resource use policies, on either ends of the wet ranges define how resources are used and managed. The using of prescribed fires during the dry season in and around protected areas, the fencing of privately owned land and around facilities along and across migratory corridors, direct harvesting of animals etc. disrupt the movement and numbers of the affected species across the MSE landscape. Another important feature of the migration which influences environmental sustainability is the migration pattern (M=3.75; SD=1.138). As mentioned earlier in this research work, and relying on the findings from the research work of Ripple et al (2015), the pattern of movement sees the wildebeests and other members of the migrating community reach different parts of the MSE at different times of the year in their cyclic movement. It was observed that this helps in ensuring environmental sustainability in at least two ways. The first one is that of bringing about nutrient

cycling in the system. The grazing and defecations across the landscape helps in the redistribution of nutrients. The migrating ungulate community in the Mara and Serengeti ecosystem consumes huge amount of plant and grass vegetable biomass per unit area. In so doing, they affect nutrient cycles through mechanisms which have both direct and indirect consequences in the functioning of an ecosystem. The ungulates (the wildebeests, the Zebras and Gazelles) greatly accelerate the recycling of nutrients in the Serengeti and the Mara through the consumption and resultant defecation and urination, thereby returning to the soil the consumed nutrients at more faster rates than would be through the natural longer process of leaf loss and grass drying and later decaying, releasing the nutrients slowly (Ripple et al, 2015; Doughty et al, 2013). Also, through the consumption by the animals, the consumed nutrients are excreted in urine and feces creating patches of concentrated nutrients that can last for several years in the ecosystem, releasing the nutrients slowly for use or storing them for future use by other plant or vegetation communities (Doughty et al, 2013; Danell et al, 2006). Thousands of the animals die at river crossings, part of the flesh is fed on by crocodiles, and the rest of the carcasses rot away releasing Carbon, Nitrogen, Phosphorous and other nutrients into the aquatic system. The nutrients are finally passed on to the terrestrial system and process repeats itself (subalusky et al, 2017). The second way of ensuring environmental sustainability is the removal of millions of tones of biomass from the physical environment though feeding on vegetation (grasses & leaves from shrubs). Being among the large wild herbivores, the migratory Serengeti and Mara wildebeest together with the accompanying migrating community of Zebras and Gazelles play a crucial role in the sustenance of the Mara-Serengeti ecosystem and the surrounding local communities (Ripple et al, 2015). As noted earlier in this research work, they form (*Connochaetes taurinus, migratory Zebra and Gazelle*) a very vital transboundary resource in the Mara and Serengeti ecosystem, whose alteration or loss can definitely have cascading catastrophic effects on other biotic & abiotic aspects of the Serengeti and the Mara, including far reaching negative impacts on large carnivores which prey on the wildebeest, and on ecological processes involving vegetation (the savanna grasses on which the wildebeests feed), Savanna grassland fire regimes (Subalusky et al, 2017; Ripple et al, 2015). In their feeding on grasses across the savanna of the MSE thereby helping in the removal of plant or vegetation biomass through increased grazing pressure, the sheer population numbers of the wildebeests and other migratory ungulates (migratory zebra and gazelles) of the ecosystem regulates the spatial distribution of fires across the landscape and also shapes the frequency & intensity of the fires (Kelly et al, 2020; Ripple et al, 2015). If the foregoing is anything to go by i.e. if the wildebeest population and those of the other migratory ungulates are altered, it may lead to a future of an ecosystem that will be deficient in or lack vital ecological services which these ungulates provide, whose end result will be enormous ecological, economic and social costs (Ripple et al, 2015).

This vegetation would otherwise dry up and help fuel up and intensify grass land fires during dry spells which escalate destruction & loss of habitat.

The contribution to environmental sustainability by migration pattern is compounded by the sheer numbers involved in the migration as found out by the study (M=3.63; SD=1.170). Apart from nutrient cycling, the ungulates also serve as food to thousands of carnivores in various parts of the MSE. The migratory route comes at the bottom in contributing to environmental sustainability. Respondents were almost neutral as to whether migration route is important (M=3.43; SD=1.375). From the foregoing results, one would conclude that all the features of the migration phenomenon are essential in ensuring a complete self-perpetuating system in the MSE. If the migration phenomenon is altered, the ecosystem is also disrupted.

Inferential Analysis

The study made use inferential statistics in trying to establish the relationship between the migration routes and sustainability of tourism development in the MSE. Each of the features of the migration phenomenon was assessed/run separately against sustainable development to establish the relationship. The results are presented in the tables below:

Table 6 Correlations between migration route and sustainability of tourism development

		AVSUSTOUDEVPT	AVMROUTE
AVSUSTOUDEVPT	Pearson Correlation	1	.376**
	Sig. (2-tailed)		.000
	N	232	232
AVMROUTE	Pearson Correlation	.376**	1
	Sig. (2-tailed)	.000	
	N	232	232

****. Correlation is significant at the 0.01 level (2-tailed).**

The Pearson Correlation results above show a weak but positive relationship between migration route and sustainable tourism. This means that when the migration route status is at or restored to its most favorable and ideal state, it contributes up to 37% to tourism development sustainability. Equally, if the migration route is varied to unfavorable state, it affects tourism development sustainability negatively up to 37%. Previously, we have seen that tourism developments (building of hospitality facilities & other visitor service centers) are done along and across migration corridors, closer to the migration routes and at iconic river crossings so as to enable visitors witness the migration experience at a closer range. The location of such businesses thus influence their performance and hence their sustainability. Unfortunately, the real situation taking shape at the MSE is that the route feature of the migration phenomenon is being interrupted and altered by the numerous human activities (Homewood et al, 2001) and to some extent the natural processes of climate change (Dore, 2005; Fyumagwa et al. 2013; Walling, 2007) and vegetation succession in and around the protected and conservation areas of Mara and Serengeti ecosystem. This means that the sustainability of tourism developments dependent on wildebeest migration route is not assured. If the route shifts or is finally truncated, tourism business will suffer loss (Harris et al, 2009).

Table 7 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.525[a]	.275	.263	.298470

a. Predictors: (Constant), AVMCOMP, AVMPATT, AVMPOP, VMROUT

As per the model summary table, the value of R Square is .275 which means that the migration route, migrating population, migration pattern & composition of the migrating community collectively influence sustainable tourism development by at least 27.5% when all other factors are kept constant. This means that if the four features of the migration phenomenon are negatively varied or interfered with by one unit (a unit change), then tourism development sustainability will be affected negatively at least by 27.5%. Equally if the features of the migration phenomenon are positively restored by one unit change towards their ideal state, favorable and original state, then tourism development sustainability is ensured by at least 27.5%.

To test how significant the effect of the independent variables is on tourism development sustainability, the F & P values results in the ANOVA table below were used.

Table 8 ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.684	4	1.921	21.563	.000[b]
	Residual	20.222	227	.089		
	Total	27.906	231			

a. Dependent Variable: AVSUSTOUDEVPT

b. Predictors: (Constant), AVMCOMP, AVMPATT, AVMPOP, VMROUT

The results from the table above indicate that F=21.563 and P=.000, while the value from the critical F-distribution table at degrees of freedom (4, 227) and at .05 significance level is 2.4114. This means that the calculated value is higher than the critical value. Hence it falls in the rejection region of the F-distribution. Further, the P value is less than .05 which means that the effect of the four features of the migration phenomenon on tourism development sustainability is statistically significant.

Multiple linear regressions also help to assess the effect of each of the features of the migration phenomenon individually on the sustainability of tourism development while holding other predictors in the model constant. Standardized beta coefficients are used in indicating the extent to which each feature can explain any changes or shifts in the relationship between the dependent and independent variables. In this case, it is the relationship between tourism development sustainability and the wildebeest migration phenomenon. Migration route can explain the changes by 16.5%. This means that if migration route is varied either positively or negatively, it influences tourism development sustainability by 16.5% either way when all other features are kept constant.

Table 9 Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.311	.218		6.013	.000
	AVMROUT	.127	.051	.165	2.497	.013
	AVMPOP	.182	.060	.182	3.014	.003
	AVMPATT	.163	.034	.293	4.834	.000
	AVMCOMP	.128	.058	.137	2.183	.030

a. Dependent Variable: AVSUSTOUDEVPT

Influence threshold of the predictor variables is raised to a higher level when the control variable (resource use & management practice) is taken into consideration. When each of the predictor variables is paired with the control variable and a regression run, their respective effect thresholds on the tourism development sustainability are raised to a higher level as compared to when the control variable is left out. The coefficients of the regression results are as shown in the tables below:

Table 10 Coefficients when Migration route is paired with the Control Variablea

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.149	.157		13.648	.000
	AVMROUT	.238	.052	.309	4.575	.000
	AVRUMP	.071	.031	.153	2.272	.024

a. Dependent Variable: AVSUSTOUDEVPT

From the foregoing regression results, it is clearly shown that there is a positive relationship between the wildebeest migration routes and sustainability of tourism development in the Mara and Serengeti ecosystem. These findings have also been indicated in the descriptive and correlation statistics. For the tourism development to be sustainable, the migration phenomenon has to persist or has to be retained by all means necessary. Continuity of all the features of the migration route has to be ensured. Therefore, while Wildlife harvesting and licensed hunting are allowed on the Tanzaniani side of the border on the Kenyan side, wildlife is conserved for tourism (hunting is forbidden and highly enforced by the conservation agencies on the Kenyan side of the border). From the forgoing, the continuity or persistence of the wildebeest migration phenomenon is threatened due to lack of a harmonized policy on how to use and manage resources in the MSE (Fyumagwa, 2013). Climate change has led to increased variability and irregularity of rainfall (Dore, 2005; Fyumagwa et al. 2013) and sometimes quite often prolonged dry spells with less vegetation or grass for the ungulates. According to Walling (2007), expected wet seasons are drier and dry seasons are wetter, a case where weather conditions have been reversed, affecting the migration pattern of the migratory species. Mara River water volumes have gone low, blamed partly on climate change and partly on the destruction of the Mau forest

and environmental degradation upstream by farming activities (Baldyga et al. 2008; Mnaya et al. 2011; Mbaria, 2018).

Table 11 ANOVA Statistics for hypothesis testing for effect of Migration Routea on Sustainability of Tourism Development.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.946	1	3.946	37.879	.000[b]
	Residual	23.960	230	.104		
	Total	27.906	231			

a. Dependent Variable: AVSUSTOUDEVPT
b. Predictors: (Constant), AVMROUT

From the ANOVA table above, the F-value is 37.879 while the critical F-value at degrees of freedom (1, 230) and at 0.05 significance level is 3.882. This means that the calculated F-value is higher than the critical F-Value, therefore falling in the rejection region of the F distribution graph. This implies that there is a statistically significant relationship between the migration route and sustainable tourism development in the MSE. For this given reason, the null hypothesis that there is no statistically significant relationship between migration route and sustainable tourism development in the Mara-Serengeti ecosystem is rejected. Further, this status is confirmed by the P value in the coefficients table below.

Table 12 Coefficients for hypothesis testing for effect of Migration Routea on Sustainability of Tourism Development.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.246	.153		14.688	.000
	AVMROUT	.290	.047	.376	6.155	.000

a. Dependent Variable: AVSUSTOUDEVPT

The P value from the coefficients table above is .000, which is less than .05 probability level. This implies that the effect of migration route on sustainable tourism development is statistically significant, therefore confirming the rejecting of the null hypothesis.

In the focus groups discussions, the researcher sought to capture sentiments and/or feelings & opinions of respondents on, and about the relationship between the wildebeest migration routes and: (i) sustainability of the Mara – Serengeti ecosystem i.e. the biotic and abiotic systems which make up the natural physical environment; (ii) sustainability of the tourism and hospitality businesses within and around the Mara-Serengeti ecosystem; and (iii) sustainability of the socio-cultural and economic livelihoods of the local people living around the Mara-Serengeti ecosystem. In the group discussions, focus was on wildebeest migration route.

In the focus group interviews, five groups in total were engaged. They included : (1) the Siana Conservancy group; (2) the Ololai Mutiek or Ololai Mutia market group; (3) Keekorock Lodge group; (4) Sekenani Gate business community group; and (5) the Kenya Wildlife Service and Narok County Government guards group.

The Siana Conservancy group was constituted from the Siana Conservancy employees. The conservancy is a local community's conservation effort initiative where a number of local private land owners have pooled their parcels of land together to pursue conservation to earn income from tourism. A number of lodges have been put up (constructed) within the Siana Conservancy by hospitality facilities and adventure investors such as the Bonfire Adventures Company. Apart from conservation efforts, the local people also make use of these areas as grazing grounds or pasture areas for their livestock, collection of firewood and other resources for family use, socio-cultural activities such as Moran initiation and training festivities among others.

Ololai Mutia market is a business center with shops and accommodation & hospitality facilities. This market center is located to the South East corner, but on the outside, of the Maasai Mara National Reserve. The market sits on or close to one of the points of the wildebeest migration corridor. It is one of the most important visitor services, entertainment and accommodation centers during the tourism peak season and which coincides with the wildebeest migration phenomenon. Sekenani gate is the major entry into and exit point of the Maasai Mara National Game Reserve. Outside and close to the gate is the Sekenani market center also providing accommodation and hospitality services to the travelling visitors. It also themes with numerous curio shops from where the local community business people trade souvenirs with visiting tourists. The market center also sits in between the National Game Reserve and the Loita Plains. The migrating wildebeests once used to reach as far as these Loita plains which used to serve as maternity grounds where mother wildebeests could raise their young calves. Being open grounds, they could sight predators from a distance and evade them easily. The plains have since been fragmented and fenced off, by private land owners, for private development (see figure 5 on page 85 above).

The Kenya Wildlife Service (National Government) and the Narok County government guards are government agencies tasked to conserve, manage, guard and oversee activities, even though tourism activities at the Maasai Mara National Reserve are purely managed and controlled by the Narok County Government. The Kenya Wildlife Service has a camp in the Reserve to assist conserve and monitor to prevent poaching of wildlife in the reserve and assist in research activities. The Mara Keekorock Lodge is an investment of the Narok County Government offering accommodation and hospitality services and conducts game drives & hot air ballooning services for game viewing.

CONCLUSION AND RECOMMENDATION

The objective was to assess the effect of the wildebeest migration route on sustainable tourism development in the Mara-Serengeti ecosystem. The null hypothesis for this objective was that there is no statistically significant relationship between wildebeest migration route and sustainable tourism development in the MSE. From the correlation and regression results, the study concluded that migration route has a positive role in tourism development sustainability in the MSE. The null hypothesis was therefore rejected.
The study recommended that migration routes should explain the changes by sustainability of tourismdevelopment.

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