



**THE ELEPHANT IN
THE ROOM:
HUMAN-ELEPHANT
CONFLICT IN
CENTRAL DISTRICT,
BOTSWANA**

January 2021

Kakale Munamati
A thesis submitted to the
University of Cape Town
Submitted in Partial
Fulfilment of the Degree
of Master of Sciences in
Environment, Society, and
Sustainability

Supervisor: Philile Mbatha

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	3
ABSTRACT	4
1. INTRODUCTION	5
1.1 Introduction and Background	5
1.2 Aims and Research Objectives	8
1.3 Rationale for the Study	8
1.4 Guide to Chapters (a summary of each chapter)	9
1.5 The Study Area	10
2. LITERATURE REVIEW	14
2.1 The Nature of Human-Elephant Conflict	14
2.2 Nature of Human-Elephant Conflict Relative to Distance to Protected Areas	18
2.2.2 Living Near Elephant Migratory Routes	21
2.3 Impacts of Human-Elephant Conflict	22
2.3.1 Livelihood impacts of Human-Elephant Conflict	22
2.4 Management and Mitigation of Human-Elephant Conflict	24
2.4.1 Traditional Methods	25
2.5 Conclusion	29
3. METHODOLOGY	31
3.1 Introduction	31
3.2 Research Approaches	31
3.3 Data Collection and Sampling	33
3.3.1 Gathering of Documentary Evidence	33
3.3.2 Farmworker and Household Sampling	34
3.3.3 Sampling	35
3.3.5 Secondary Data - Data Collection from the Department of Wildlife and National Parks (DWNPs), Gaborone	38
3.4 Data Analysis	39
3.4.1 Quantitative Data Analysis	39
3.4.2 Qualitative Data Analysis	40
3.4 Ethical considerations	41
3.5 Limitations of the study	41
3.6 Conclusion	42

4. RESULTS	43
4.1 Understanding the Nature of Human-Elephant Conflict in Central District	43
4.2 The Impact of Human-Elephant Conflict on the Livelihoods of Local Community Members	48
4.3 Perceptions of Government Management of Human-Elephant Conflict	51
4.3.1 Stated Government Responses to Human-Elephant Conflict as documented in Policy Documents	52
4.3.2 Documentary Evidence of Government Intervention	57
4.3.3 Perception of Government Interventions in Human-Elephant Conflict Management	60
5 DISCUSSION	63
5.1 The Nature of Human-Elephant Conflict in the Central District	63
5.2 Impacts of Human-Elephant Conflict on the Livelihoods of Community Members	66
5.3 Government Management of Human-Elephant Conflict in the Central District	67
5.3.1 Government Interventions Globally	68
5.3.2 Government Interventions in Mmashoro Village and Surrounding Farms	69
5.3.3 Compensation as A Government-Led Management Tool	71
5.4 How Government Interventions Constrain or Enable Sustainable Livelihoods	72
6. CONCLUSION	74
7. REFERENCES	77

Table of Figures

Figure 1: Map of Botswana with Mmashoro Village indicated with the polygon	12
Figure 2: A map showing the Mmashoro Village area	13
Figure 3: The relative location of the Central Kalahari Game Reserve (CKGR) in relation to Mmashoro Village (blue outline).....	17
Figure 4: Changes in Elephant Population from 2003 to 2013 in the Central District. A general increasing positive trend is seen in Figure 42 which indicates that the elephant population of the Central District has been generally increasing over time (Department of Wildlife and National Parks, 2018).	45
Figure 5: Changes in Elephant Density from 2003 to 2013 in the Central District. A general increasing positive trend is seen in Figure 2 which indicates that the elephant population of the Central District has been generally increasing over time (Department of Wildlife and National Parks, 2018).	46
Figure 6: Facebook Post from the Botswana Government Official Facebook Page warning Mmashoro residents of elephants roaming (Government of the Republic of Botswana, 2020) ...	58
Figure 7: Brand Botswana Advertising on June 15, 2019 notifying residents that elephants have wandered into human communities. (Brand Botswana, 2019)	59

ACKNOWLEDGEMENTS

I would like to thank my parents Kumbulani and Dorothy Munamati for instilling in me a passion for learning and self-development and funding this passion. I would also like to thank the National Research Foundation for providing me with a scholarship for my Masters. To my supervisor, Philile Mbatha, thank you for your support, advice and sisterly care, I am truly grateful. Lastly, to God, thank you for the opportunity.

ABSTRACT

Human-Elephant Conflict is a topic of conservation and socio-economic concern in light of its impacts on elephants and humans alike. The phenomenon has been occurring since the 19th century in Asia and Africa. Land use changes and human expansion into previous wildlife strongholds has exacerbated and increased Human-Elephant Conflict notwithstanding the impacts of an increase in the human population worldwide. Human-Elephant Conflict usually occurs in areas adjacent to protected areas with little know of the nature of Human-Elephant Conflict in areas which are not located near protected areas. Mmashoro Village and surrounding farms are an example of an area that is not located adjacent to a protected area but that is still exposed to Human-Elephant Conflict.

The nature of Human-Elephant Conflict in Mmashoro village and surrounding farms consists of damage to fences, JoJo tanks and private gardens. Human-Elephant Conflict in Mmashoro village and surrounding areas has also been increasing over time. Human-Elephant Conflict in Mmashoro village and surrounding farms has varying (in degree and extent) impacts on the financial and emotional livelihoods of farm owners, farm workers, and local residents. This study found that the management strategies employed by the Government of Botswana to mitigate impacts of Human-Elephant Conflict were found to be inhibiting and restricting the livelihoods of all stakeholders. The interventions pursued by the government were, therefore, not enabling the present and future potential livelihoods of all stakeholders while also disadvantaging and prejudicing other stakeholders such as Local Residents and Farm Workers.

The results of this study therefore indicate that Mmashoro village and surrounding farms present as an interesting case study as the site is not located next to protected areas as is the case with various conflict regions. As such, this study found that more nuanced and adapted management strategies were needed to ensure that government interventions were effective in areas such as Mmashoro Village and surrounding farms. Further studies are needed in sites which are not located next to protected areas but where Human-Elephant Conflict still occurs albeit haphazardly. Such studies will help to highlight the varied approaches often needed in the different geographical and social regions even though such approaches are often disregarded.

1. INTRODUCTION

1.1 Introduction and Background

Human-Elephant Conflict constitutes an array of adverse interactions between elephants and humans which in one way or other harms one or both of the species (Pozo et al 2017). Human-Elephant Conflict commonly occurs at the intersection of human development and protected areas and mostly occurs where elephants and humans share habitat permanently in close proximity to protected areas (Verreynne 2019, Mumby and Plotnik 2018; Jadhav and Barua, 2012). In most studies, Human-Elephant Conflict takes place where agricultural land use expansion and wildlife areas overlap (Pozo et al 2017, Perrera 2009, Warner et al, 2008).

Over the decades, the topic of Human-Elephant Conflict had gained traction and has become a topic of great conservation concern (Gubbi 2012; Warner 2008; Sitati et al 2003). Graham et al (2011) state that Human-Elephant Conflict “undermines biodiversity conservation and development efforts”. This phenomenon presents a challenge to conservationists since elephants have been considered a vulnerable species by the International Union for Nature Conservation (IUCN) since 2004, but are also often viewed as a pest species by human populations and rural settlements (Wilson et al 2015; Zhang and Wang 2003; Sitati et al 2003). Dublin and Hoare (2004) regard this as elephants assuming a two-layered role in society where they are an important species from a conservation perspective but are also role players in conflict with humans. Their double role further restrains the extent to which the conservation of elephants and the management of Human-Elephant Conflict can be successfully achieved (Pozo et al 2017 and Wilson et al 2015).

Human-Elephant Conflict is known to take on several forms, including crop-raiding which is the most common form (Salerno et al 2018, Pozo et al, 2017; Hedges and Gunaryadi, 2010; Warner, 2008), damage to structures and infrastructure, disturbance and hinderance to people’s normal activities (this may be in preventing daily commutes), and injury and death of both humans and elephants (Sitati et al 2003). Where communities live near protected areas, elephants have been found to forage outside of protected areas at night often destroying crops through crop raiding (Mayberry et al 2017 and Pozo et al 2017). Due to the proximity to protected areas, elephants are able to use the protected areas as sites of refuge after crop raiding. However, little is known of the nature of conflict where communities do not live near protected areas but still face Human-Elephant Conflict (Neupane et al 2017).

Human-Elephant Conflict typically impacts on and places at risk the livelihoods of local communities. Livelihoods are threatened by loss of crops as a result of crop raiding, damage to structures, inability to access work opportunities due to fear of movement, and loss of emotional wellbeing (Mayberry et al 2017, Pozo et al 2017, Jadhav and Barua 2012). Impacts of Human-Elephant Conflict on the livelihoods of communities living near protected areas are more consistent prolonged, predictable and pronounced (Neupane 2017).

In cases where communities are situated near protected areas, Human-Elephant Conflict impacts on the livelihoods of community members in different ways due to its differentiated impact on different stakeholders (Mayberry et al 2017, Pozo et al 2017, Masunga 2007, Mosojoane et al 2004). Firstly, studies have shown that Human-Elephant Conflict has a direct financial impact on human livelihoods through the loss of crops from crop-raiding (Pozo et al 2017). Since most Human-Elephant Conflict hotspots are in rural and natural areas adjacent to protected areas, there is a high community dependence on subsistence farming for sustenance and income (Pozo et al 2017, Desai and Riddle 2015, Mosojoane 2004). As a result, when Human-Elephant Conflict through crop-raiding occurs, people lose their sustenance as well as their income that they could have earned through trade. Human-Elephant Conflict impacts on the local, rural economies as well as personal finance of community members living near protected areas.

Secondly, Human-Elephant Conflict impacts on infrastructure and the reliability thereof (Neupane et al 2017, De Motts and Hoon 2012, Masunga et al 2007, Mosojoane 2004). Through the destruction of fences, water tanks, and at times hut houses by elephants, Human-Elephant Conflict may threaten the security and safety of homes in rural areas (Jadhav and Barua 2008). Since most human settlements affected by Human-Elephant Conflict are in and adjacent to protected areas, this impact increases the exposure of people to other wild animals and compounds the risk to human lives as a result of potential contact with wild animals (Desai and Riddle 2015). In this way, Human-Elephant Conflict paves the way for increased Human-Wildlife Conflict.

Lastly, studies have shown that Human-Elephant Conflict has ‘unseen impacts’ on local communities (Mayberry et al 2017 and Jadhav and Barua 2012). The presence of elephants in the vicinity of human settlements results in increased anxiety and fear prevailing in local

communities. This was confirmed in studies on Human-Elephant Conflict in Asia (Jadhav and Barua 2012) and Africa (Mayberry 2017). This results in emotional impacts on local communities and manifests as a fear of moving and a loss of sleep for other residents. While these impacts are mostly unseen and intangible, their effect on local communities is palpable and contributes to the overall common impact that Human-Elephant Conflict has on local communities globally.

Few studies have assessed impacts on communities who do not live near protected area but are still exposed to Human-Elephant Conflict globally and locally in Botswana. According to Verreynne (2019), 22% of the elephant range in Botswana is located outside of protected areas and Wildlife Management Areas. Elephants may be settling outside of their ranges semi-permanently. Elephants are migrating further south of Botswana resulting in increased movement of elephants into human settlements in areas such as the Central District where large areas of the district are located outside of Protected Areas and Wildlife Management Areas. As this is a relatively new phenomenon in Botswana, not many studies have been undertaken to assess the impacts of relatively new and temporary Human-Elephant Conflict located relatively far from protected areas notwithstanding the impact of this new phenomenon on livelihoods of communities.

Given the impacts that Human-Elephant Conflict has on local, often disenfranchised rural communities, the management of Human-Elephant Conflict is necessary and critical (Salerno et al 2018, Pozo et al 2017, DeMotts and Hoon 2012). The management of Human-Elephant Conflict confronts the common problem in conservation management, which is, the level to which conservation can be achieved while simultaneously meeting human needs (Warner 2008). The challenge of managing Human-Elephant Conflict is further compounded by the fact that elephants are an endangered species as per the IUCN (Wilson et al 2015 and Gubbi 2012). Conservation management efforts must ensure the conservation of the species while accommodating the land-use and spatial requirements of local communities (Wilson et al 2015). Globally, many countries have had limited success with the management of Human-Elephant Conflict resulting in increased tensions between local communities, governments, and wildlife particularly where communities are located near protected areas (Neupane et al 2017, Mayberry et al 2017, Jadhav and Barua 2012, Hoare et al 2004, Mosojoane 2004).

1.2 Aims and Research Objectives

Aim

The specific aim of the study is to investigate how relatively recent incidents of Human-Elephant Conflict are impacting the livelihoods of local people in Mmashoro Village and surrounding farm area in Botswana. The study seeks to unpack how local people respond to such conflict and whether there are any government interventions put to enable local people's livelihoods to progress, despite being confronted with the recent phenomenon of Human Elephant Conflict.

Objectives

The specific objectives of this study are:

- To understand the nature of Human-Elephant Conflict in the Central District of Botswana;
- To determine how livelihoods of the local community have been affected by Human-Elephant-Conflict in the area, and how members of the community have been responding to the impacts of Human-Elephant Conflict.
- To assess local perceptions of whether the government's response to Human-Elephant Conflict in the area is enabling or prohibiting livelihoods of the local community by comparing government interventions as documented in documentary evidence versus the lived experience of community members affected by conflict.

1.3 Rationale for the Study

Human-Elephant Conflict is a widely studied topic particularly in Asia (Sampson et al 2018, Neupane et al 2017, Chen et al 2016, Wilson et al 2015) and southern Africa (Salerno et al 2018, Purdon et al 2018, Pozo et al 2017, Cooper 2013). Most studies into Human-Elephant Conflict have occurred in areas where communities affected by conflict are located adjacent to protected areas where elephants are found (Neupane et al 2017, Jadhav and Barua 2012, Mosojoane 2004). In Botswana, the southern African nation located directly north of South Africa the topic of Human-Elephant Conflict is widely studied in the northern reaches of the country where communities are located adjacent to protected areas (Salerno et al 2018, Warner et al 2008, Jackson et al 2008; Mosojoane 2004).

Very few studies have been undertaken on Human-Elephant Conflict in the Central District of Botswana located south of the Okavango area (Mayberry et al 2017) where communities are not generally located adjacent to protected areas. Mmashoro Village in the Central District of Botswana is an example of this as the area, located more than 300 km east of a protected area, is increasingly frequented by elephants with associated Human-Elephant Conflict incidents (Department of Wildlife and National Parks, 2012). These incidents are not well documented, studied, and investigated. Furthermore, studies into Human-Elephant Conflict are often in areas with a long historical record of Human-Elephant Conflict incidents (Salerno et al 2018, Songhurst 2012, Jackson et al 2008, Warner 2008, Masunga et al 2007, Mosojoane 2004). Few studies have been conducted to document areas where Human-Elephant Conflict has commenced relatively recently (i.e. within the past decade). For instance, Mmashoro Village and its surrounding farms located in the Central District of Botswana have had Human-Elephant Conflict occurring relatively recently (i.e. since approximately the year 2012).

Mmashoro Village and the farms surrounding this village present an interesting narrative, therefore, on several counts. The first and the main focus of this thesis is that Human-Elephant Conflict occurring in this area impacts on a community that is not located adjacent to a protected area. A study into Human-Elephant Conflict in the area will shed light on the dynamics of Human-Elephant Conflict in areas which do not share an immediate geographic space with elephants. In this way the study will have global and local significance as it will contribute foundational knowledge of the occurrence of Human-Elephant Conflict away from protected areas. Following from this, this thesis will assess how Human-Elephant Conflict impacts on the livelihoods of local communities who are not located near protected areas. This research will, also, assess how government interventions constrain or enable livelihoods of residents affected by Human-Elephant Conflict in the Central District.

1.4 Guide to Chapters (a summary of each chapter)

The first chapter of this dissertation has provided an introduction and brief context to the topic of Human-Elephant Conflict. The chapter has also highlighted the context of the current study and the use of a case study area to achieve the aims and objectives.

Chapter Two entails the literature review which will locate the current research in the context of research that has been undertaken on the topic globally, in Southern Africa, and Botswana. The chapter will also explore the impacts of Human-Elephant Conflict on livelihoods of local communities in other parts of the world particularly Asia including the response and management of conflict by government and local communities.

Chapter Three is concerned with the research methodology that was employed to achieve and realise the aim and objectives of the study.

The fourth chapter will unpack the results and discuss the results in the context of the objectives of the study.

The fifth chapter will provide a discussion of the results and a discussion of how the results responded to the aims and objectives.

The sixth chapter will contain the conclusion of the report.

1.5 The Study Area

Botswana is a landlocked country located in Southern Africa bordered to the south by South Africa, to the west by Namibia to the north by Angola and Zambia, and to the east by Zimbabwe. Botswana has a relatively low human population of 2,038,228 according to Statistics Botswana (2010). It comprises 16 administrative districts of which Central District is one of them (See Figure 1). The population of the Central District is 576,064 with a workforce of 101 149 according to Statistics Botswana (2011). Central District like much of the southern and central areas of Botswana is characterised by a hot wet summer and cold dry winter climate regime. Maximum temperatures in the district can reach 35 degrees Celsius while minimum temperatures can reach 9 degrees Celsius.

Mmashoro village and its surrounding farms are located relatively centrally in the Central District (GPS Coordinates: Latitude: -21° 52' 1.79" S Longitude: 26° 26' 12.59" E). Mmashoro Village is located approximately 80km northwest of Serowe, the largest town in Central District and north of the A14 Road. The population of Mmashoro was recorded as 1543 in the

2001 census (Statistics Botswana, 2001). The climate of Mmashoro is like that of the Central District with hot wet summers and cold dry winters. Mmashoro is surrounded by villages with similar populations including Mmalatswae village which also experiences Human-Elephant Conflict. Mmashoro is located 300km east of the Central Kalahari Game Reserve, a national park where elephants can be found. As such, the village is located relatively far from a protected area as opposed to the Okavango and Chobe areas that have been discussed above. Mmashoro Village would not therefore be in line with the description of areas of Human-Elephant Conflict described above where “agricultural expansion coincides with wildlife areas”. With Mmashoro Village and surrounding farm areas, agricultural expansion is located 300km east of a wildlife area.

The hierarchical structure of governance in Mmashoro consists of national government, district authorities, and lastly village authorities (the village chief administers this level of governance). Most community-level disputes are addressed by the chief of the village who is regarded in high esteem. Most community members in the village find employment as a farmworker in the nearby farms and often return home during the December period while some community members seek employment in the nearby town of Serowe. Very few employment opportunities exist in the village as such the general population in the village consists of older community members and young children

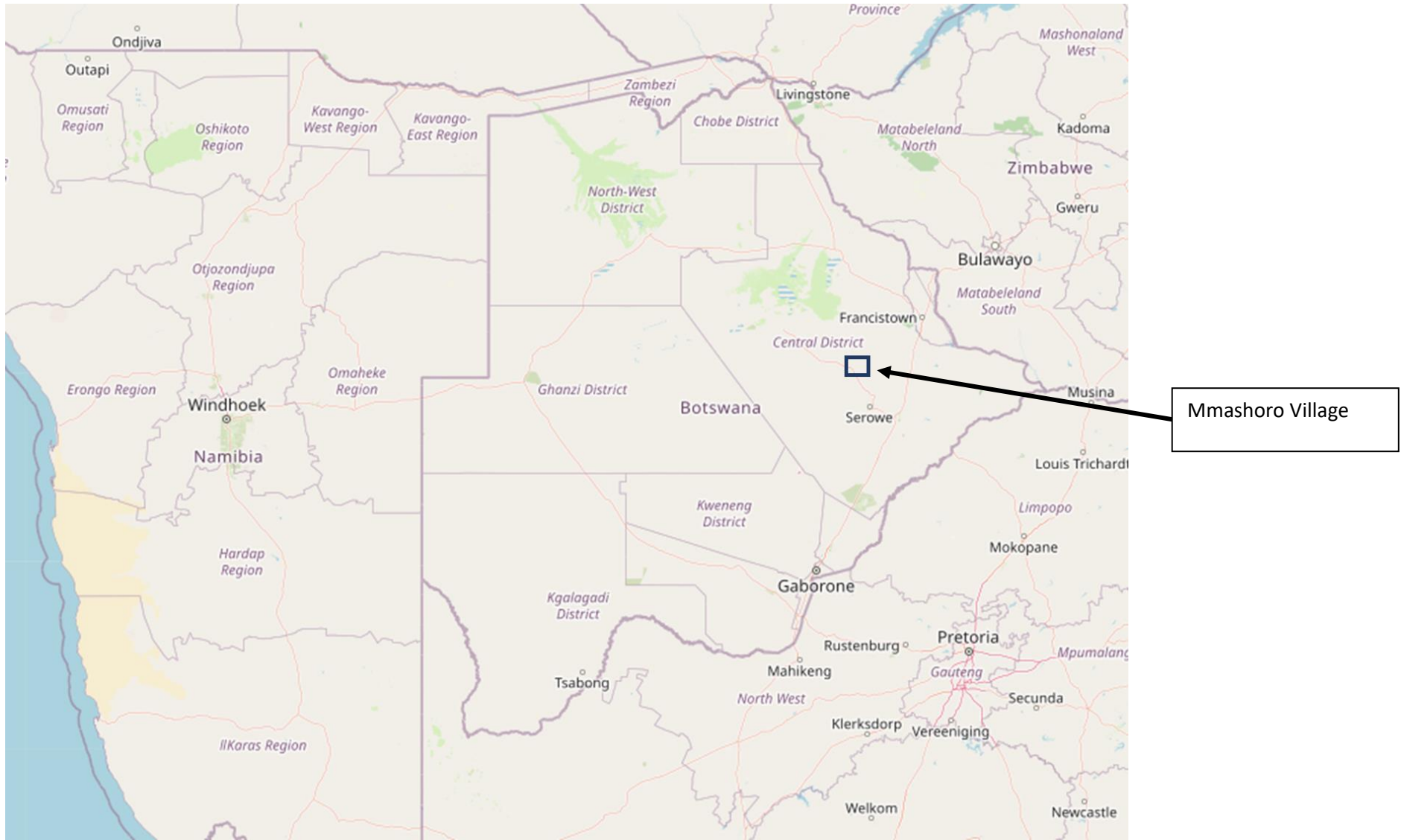


Figure 1: Map of Botswana with Mmashoro Village indicated with the polygon



Figure 2: A map showing the Mmashoro Village area

2. LITERATURE REVIEW

This chapter will introduce the topic of Human-Elephant Conflict and describe the nature of Human-Elephant Conflict on a global scale showcasing studies that have been undertaken in Asia and Africa. The literature review will then pan to an African context and explore the nature of Human-Elephant Conflict, particularly in Africa. Thereafter, literature will be presented which describes the impacts of Human-Elephant Conflict on community livelihoods. The literature review will lastly focus on how government interventions on Human-Elephant Conflict inhibit or promote livelihoods of local communities as per the Sustainable Livelihoods Framework.

Through this, the nature of Human-Elephant Conflict near protected areas and where communities are located far from protected areas, governance structures, and impacts of Human-Elephant Conflict on human livelihoods will be highlighted. The literature review in this section, therefore, seeks to establish this research in the context of published and known work in the field of Human-Elephant Conflict globally, in Africa, and Botswana (the location of the case study). The review aims to show the relevance of this work in the context of continued research into Human-Elephant Conflict in Botswana and highlight gaps in knowledge and opportunity for further nuanced research.

2.1 The Nature of Human-Elephant Conflict

Elephants and humans have coexisted in geographical spaces for thousands of years (Locke 2013). Elephants were utilised as war weapons between 3300 BC to 1300 BC (Locke 2013). This indicates a clear spatial and functional relationship between humans and elephants and further corroborates the claim that elephants and humans have co-existed for thousands of years (Mosojoane 2004). However, the history of Human-Elephant Conflict is of more recent origin as it speaks to the period from which humans and elephants began to exist in conflict with each other. In Asian countries, elephants were held in high cultural and heritage esteem (Jadhav and Barua 2012 and Fernando et al 2004) albeit, in countries such as Indonesia, the association between humans and elephants was less cordial.

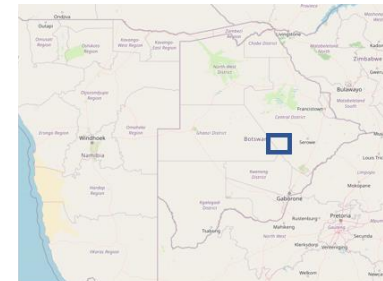
Due to the high regard with which humans held elephants in Sri Lanka, a human population of about 19 million people was able to coexist with an elephant population of two to four thousand in an area not larger than 65 000km² (Fernando et al 2004). As such, humans and elephants coexisted with a high elephant density and low human density in overlapping areas (Jadhav and Barua 2012 and Fernando et al 2004). Fernando et al (2004) argue that the traditional communal agricultural practices that were undertaken during this time facilitated harmonious relations between humans and elephants. The argument is, therefore, that a change in agricultural practice and an increase in the human population which led to the relatively rapid transformation of elephant habitat into human settlement has contributed to present-day Human-Elephant Conflict in Sri Lanka and other parts of Asia (Jadhav and Barua 2012 and Fernando et al 2004). As such, the nature of the Human-Elephant Conflict in Asia in the early 20th century was relatively non-existent as agricultural practices allowed for humans and elephants to utilise spaces periodically.

In Africa, the history and nature of Human-Elephant Conflict vary from that of Asia. According to Naughton et al (1999), Human-Elephant Conflict in Africa has existed for as long as agricultural practices have existed and been pursued (Hoare 2002). Historians have shown that crop-raiding by elephants was recorded as early as the 19th century with large impacts on food security on different areas of the continent (Naughton et al 1999). They argue that it is a long-standing belief in some rural African communities that elephants and humans in Africa shared a harmonious relationship but that this was destroyed by the aggressive hunting regimes of colonial rulers (Department of Wildlife and National Parks, 2012). During colonial times (20th century), elephant populations were strictly controlled and consequently decimated by shooting (Botswana Department of Wildlife and National Parks 2012 and Hoare 2001). This contributed to the decline of elephant populations in numerous wild areas of the continent. In Cameroon, for instance, elephant populations were managed by game hunters through culling (Tchamba 1996). This resulted in fewer crop-raiding incidents in the Waza-Logone Region of Cameroon (Tchamba 1996). Residents of Gabon on the other hand faced starvation because of frequent elephant crop-raiding and in Western Uganda, the agricultural practice was abandoned because of high elephant populations crop-raiding and consequent impacts on food availability (Naughton et al 1999).

In Botswana, the country in which the study area is located, a decline in the elephant population and other wildlife in the 20th century was caused by a severe drought in the 1980s. High wildlife

mortality was observed during this period including the widespread mortality of elephants (*Loxodonta africana*). Boreholes were then installed in the Central Kalahari Game Reserve (CKGR) in the Central District of Botswana to alleviate the impacts of the drought and avail water for wildlife (Mayberry et al 2017 and Research and Statistics Division Department of Wildlife & National Parks Botswana, 2012).

Between 1992 and 2012, elephant populations in Botswana increased by 297% with notable increases in Makgadikgadi and Nxai Pans National Parks in the Central District (See Figure 2) and increases in the Okavango Delta area north of the Central District (Research and Statistics Division Department of Wildlife & National Parks Botswana, 2012). The impacts of this increase can be noted in various Human-Elephant Conflict stronghold areas in Botswana namely the Okavango Delta Eastern Panhandle and the Chobe River area (Salerno et al 2018 and Pozo et al 2017). Studies have shown that Human-Elephant Conflict in this area has increased (Mayberry et al 2017, Jackson et al 2008, Mosojoane 2004) coinciding with the increase in elephant populations. The impact of this increase on communities in the northern reaches of the country has been mostly detrimental with some community members abandoning farming as an activity because of the losses they experience as a result of crop-raiding (Salerno et al 2018 and Pozo et al 2017). Human populations have also increased in rural areas adjacent to protected areas in Botswana resulting in increased competition between humans and elephants for water resources (Salerno et al 2018 and Pozo et al 2017). The impact of the increase of elephants on areas in the Central District has been highlighted in the study by Mayberry (2017) where it was found that impacts of Human-Elephant Conflict resulted in visible impacts and invisible impacts in the form of impacts on wellbeing. No studies have, yet, documented this increase in Human-Elephant Conflict areas where Human-Elephant Conflict is relatively recent, and few studies have documented increases in Human-Elephant Conflict in areas located a distance away from protected areas such as several areas in the Central District of Botswana (Neupane 2017).



Legend




-  - Mmashoro Village
-  - A14 Road
-  - B300 Road

Figure 3: The relative location of the Central Kalahari Game Reserve (CKGR) in relation to Mmashoro Village (blue outline)

2.2 Nature of Human-Elephant Conflict Relative to Distance to Protected Areas

Human-Elephant Conflict usually occurs at the interface of human settlements and elephant ranges. Dublin and Hoare (2004) argued that Human-Elephant Conflict is inherently spatial and motivated for a need for all future studies into Human-Elephant Conflict to focus on the spatial nature of Human-Elephant Conflict in the quest to determine what drives the phenomenon. However, Naughton et al (1999) and Mosojoane (2004) argued that Human-Elephant Conflict cannot be attributed to a single factor or motivation but instead a myriad of factors can contribute to Human-Elephant Conflict. Furthermore, because of the large potential range of Human-Elephant Conflict (Neupane et al 2017 and Hahn et al 2017), several studies have shown that there are various plausible and proven determinants of Human-Elephant Conflict and that several factors can contribute to Human-Elephant Conflict in any localised area. These include:

1. Land-use changes and agricultural expansion (Salerno et al 2018, Neupane et al 2017, Pozo et al 2017, Munster 2012, Jackson et al 2008, Warner et al 2008, Fernando et al 2004, Dublin and Hoare 2004, Naughton et al 1999, Tchamba 1996)
2. The role of problem elephants and behavioural ecology (Salerno et al 2018, Masunga et al 2007, Mosojoane 2004, Hoare 2001).
3. The “Male Behaviour Hypothesis” (Sitati et al 2003, Hoare 2001)
4. Rainfall and Seasonality (Hoare et al 2012, Hoare 2001),
5. Increases in elephant and human populations (Fernando et al 2004, Dublin and Hoare 2004, Tchamba 1996),
6. Changes in the social context and interactions of rural communities (De Motts and Hoon 2012 and Naughton et al 1999),
7. Widespread poverty (Salerno et al 2018, Dublin and Hoare 2004),
8. The political will to transform rural areas into conservation landscapes (Massé 2016))

For this mini-dissertation, the following two causes of Human-Elephant Conflict will be discussed in detail in so far as their relation to the nature of Human-Elephant Conflict. These are:

- Living Near Protected Areas
- Living far from Protected Areas

2.2.1 Living Near Protected Areas as a Cause of Human-Elephant Conflict

In a study by Sitati et al (2003) conducted in two settlements in Sri Lanka (Yala and Kehalle), the location of human settlements in proximity to protected areas was highlighted as a cause of Human-Elephant Conflict. The study examined two varying land-use regimes in Yala and Kehalle to determine how the location of human settlements adjacent to protected areas influenced the nature of Human-Elephant Conflict in the aforementioned areas (Fernando et al 2004). In Kahalle, the land-use regime was a mosaic of human settlements, agricultural areas, and forested areas. Crops were grown over two growing seasons per year in Kahalle and areas designated for human use and elephant use were not clearly defined. As a result, elephants would occupy the forest patches of the area during the day and would raid crops in the agricultural areas at night (Fernando et al 2004).

In Yala, however, well-defined human and elephant areas resulted in crop-raiding of significant crops being minimised (Fernando et al 2003). Furthermore, the local residents only relied on one growing season per year. During the wet season, elephants could feed on foliage within the protected area while locals harvested the annual crop. During the dry season when elephants would forage outside of the protected area, they would feed on leftover crops in fields that were lying fallow. This form of farming was explained by Fernando et al (2004) as a traditional farming technique and likely to be the most effective in mitigating Human-Elephant Conflict in Sri Lanka. As such, this study indicated that proximity of human settlements to protected areas resulted in Human-Elephant Conflict. The study, however, showed that the impact of the inevitable conflict could be minimised and mitigated by changes in agricultural regimes and the adoption of traditional forms of crop farming.

In China, Zhang and Wang (2003) argued that land-use changes as a result of agricultural expansion had resulted in a competition for increasingly scarce land between humans and elephants. In so doing, this study demonstrated that the location of human settlements in proximity to protected areas and further expansion into these areas had resulted in intensified conflict with elephants.

The location of human settlements adjacent to protected areas is a common occurrence in Africa that also leads to Human-Elephant Conflict, often in the form of crop-raiding (Adams

et al 2017 and Hahn et al 2017). Salerno et al (2018) argued that modern African land-use practices such as the conversion of land for agriculture were a contributing factor to the Human-Elephant Conflict. The expansion of agriculture into unoccupied wild areas was described as an intensifying factor to the Human-Elephant Conflict in Africa twenty years prior (Naughton et al 1999). This expansion into wildlife habitat for agricultural purposes is driven by an increase in human populations in localised areas, the expansion of settlements by the state as a means of providing social housing and shifts from pastoral activity to farming (Naughton et al 1999). Dublin and Hoare (2004) argue that land use in these areas has therefore developed into a matrix of human settlements interspersed in natural and unoccupied wild habitats forcing humans and elephants to compete for scarce land and resources (Martin 2019, Neupane et al 2017, Pozo et al 2017, Mosojoane 2004, Naughton et al 1999).

An example of this was studied in the African forests of Cameroon where unmanageable logging of trees transformed land previously used by elephants and resulted in human settlements which were now closer to protected areas and elephant ranges being more likely to interact (Dublin and Hoare 2004). Through the removal of forest trees, the establishment of secondary vegetation encouraged the movement of elephants closer to human settlements (Naughton et al 1999). The subsequent creation of artificial water sources in new settlements adjacent to protected areas further exacerbated conflict with elephants in the area. As such, this study and the aforementioned studies indicate that the location of settlements close to protected areas is a cause of Human-Elephant Conflict.

In Botswana, changes in land use have also resulted in the creation and proliferation of human settlements closer to wild areas further exposing residents to Human-Elephant Conflict (Hahn et al 2017). Land use in Botswana has changed as a function of land tenure (Ntumy 2014). Land tenure in Botswana has been decentralised from the administration of communal land to delegated local land and local government administration (Ntumy 2014). In addition to changes in land tenure in Botswana, the use of land particularly in rural areas has also been altered (Warner 2008).

There is an increasing agricultural expansion in the rural areas of Botswana where livestock and crops equate to wealth (DeMotts and Hoon 2012). The role of increasing and expanded agricultural activity into previously unutilised wild areas which bring communities closer to protected areas is a contributing factor to Human-Elephant Conflict in the Eastern Panhandle

of the Okavango Delta located in the northern reaches of Botswana (Pozo et al 2017). In the Okavango Delta area, most Human-Elephant Conflict occurs where settlements are located near protected areas and compete for water resources with elephants (Adams et al 2017, Mayberry et al 2017 and Hahn et al 2017).

2.2.2 Living Near Elephant Migratory Routes

In some cases, Human-Elephant Conflict located far from protected areas is caused by the presence of human settlements near elephant migratory routes (Martin 2019, Nkala 2015). This is because although elephants are usually situated within protected areas, according to Mayberry et al (2017), elephants have large home ranges and resource demand and therefore often venture outside of protected areas and encounter people. As such, those with settlements along the path of elephants would be at risk of Human-Elephant Conflict (Hahn et al 2017). Living near elephant migratory routes is, therefore, a contributor to Human-Elephant Conflict. The nature of Human-Elephant Conflict is one that is confrontational often resulting in injury or death of one or both of the species (humans and elephants) (Martin 2019, Mayberry et al 2017).

Jackson et al (2008) found that the overlapping spatial use of land between humans and elephants was a major contributing factor to Human-Elephant Conflict. They further stated that Human-Elephant Conflict typically occurs outside of protected areas where human settlement ranges and elephant ranges are both simultaneously expanding. This was also stated by Mayberry et al (2017). A study into Human-Elephant Conflict over 10 years in Nepal found that the highest incidents of conflict occurred along the elephant migratory route (Neupane et al 2017). It must be noted that it would be too simplistic to state that the location of human settlements along elephant migratory routes is a cause of conflict on its own. Rather, according to Neupane et al (2019), the conversion of elephant habitat into agricultural land has reduced available habitats for the Asian elephant which is a migratory species. This reduction in habitat has also caused fragmentation and loss of connectivity between elephant habitats now located in protected areas (Martin 2019 and Neupane et al 2017). As such, settlements located near migratory routes, albeit outside protected areas, have become at higher risk of conflict with elephants as elephants seek out their old habitats and migratory routes (Nkala 2015).

According to Martin (2019), savannah elephants which occur in countries such as Kenya, Zimbabwe, and Botswana migrate over large distances. It is likely, according to Martin (2019), that in Africa people have settled on old elephant migratory routes unknowingly and that some roads have been constructed over these routes. This statement is also echoed by Nkala (2015) who stated that an increase in elephant populations in Botswana may be due to elephants exploring their old migratory routes. A study into the Human-Elephant Conflict in Tanzania further confirmed that being located close to migratory routes was a cause of Human-Elephant Conflict (Gray and Cappelletti, 2016). In the study, it was found that human activities were encroaching into an elephant migratory corridor located outside of Manyara National Park and Tarangire National Park resulting in increased human-elephant conflict (Gray and Cappelletti (2016). Thus, while human settlements were not located near protected areas, since they were located near migratory routes, Human-Elephant Conflict was still occurring.

Few studies have studied the occurrence of Human-Elephant Conflict far from protected areas. This thesis will focus on the nature of Human-Elephant Conflict which arises from settlements located far from protected areas and draw on documentary evidence to ascertain how Human-Elephant Conflict which occurs far from protected areas impacts the livelihoods of local communities.

2.3 Impacts of Human-Elephant Conflict

Human-Elephant Conflict has an impact on humans and elephants alike. On elephants, impacts include death and harm to elephants when in conflict with people (Mayberry et al 2017). On people, impacts of Human-Elephant Conflict are often varied in type and extent. For this mini-dissertation, the impacts of Human-Elephant Conflict on people will be focused on impacts on the livelihoods of local communities.

2.3.1 Livelihood impacts of Human-Elephant Conflict

Direct costs of Human-Elephant Conflict impacts are those that can be linked to conflict with elephants and are referred to as visible impacts in Mayberry et al 2017. Direct impacts of Human-Elephant Conflict are loss of crops due to crop raiding, injury, death, and destruction of fences and infrastructure (Stevens 2018 and Desai and Riddle, 2015). In an economic sense, direct impacts of Human-Elephant Conflict are loss of income due to raided crops and loss of

seasonally available crops. Crop raiding is the most common impact of Human-Elephant Conflict in Asia and Africa (Stevens 2018, Pozo et al 2017, Neupane et al 2017, Masunga et al 2007, Hoare et al 2004). In Botswana, crop-raiding is also the most common form of Human-Elephant Conflict resulting in localised food insecurity and loss of income (Pozo et al 2017, Hoare et al 2012, Masunga et al 2007, and Mosojoane et al 2004).

Some indirect costs of Human-Elephant Conflict include the resources spent preventing crop raiding (Desai and Riddle 2015). This may include driving to report the conflict to wildlife authorities, purchasing and using bees, and chilli to ward off elephants as well as the use of firewood in lighting fires to deter elephants from crops (Salerno et al 2018 and Mosojoane 2004). These actions all carry an indirect cost associated with the impact of crop-raiding or damage to infrastructure (Desai and Riddle 2015).

Another indirect cost of Human-Elephant Conflict is the opportunity cost of deterring elephants from fields and preventing crop raiding (Shaffer et al 2019). In many communities, males in the community stay up during the night as guards to ward off potential problem elephants. Most times, young children who are males are also required to participate. In so doing, the productivity of local communities the following day and the productivity of students in school is greatly affected. This indirect cost, although not directly quantifiable, is an undeniable cost and layer of the impact of Human-Elephant Conflict (Shaffer et al 2019). Furthermore, the opportunity cost is that the potential for utilising the time to ward off elephants engaging in other activities is minimised.

2.3.2 Emotional livelihood impacts of Human-Elephant Conflict

The impacts of Human-Elephant Conflict on the emotional livelihood of communities are varied and can depend on the type of actions taken to prevent the direct impacts of Human-Elephant Conflict by local communities (Jadhav and Barua 2012). Impacts of Human-Elephant Conflict on emotional livelihood are described as “invisible impacts” (Mayberry et al 2017). Barua and Jadhav (2012) describe these types of costs as being emotional costs associated with experiencing Human-Elephant Conflict frequently which results in feelings of fear and anxiety. While these costs cannot be quantified and are not tangible, the impact of the conflict on the emotional wellbeing and emotional livelihood of local communities is present. These emotions then manifest as a fear of moving as a result of fear of encountering an elephant (Pozo et al

2017). A study undertaken by Mariki et al (2015) found that the indirect impact of Human-Elephant Conflict resulted in the killing of elephants by local communities who felt marginalised by conservation efforts that excluded them and did not take their use of the land into account when planning for conservation efforts. Similar sentiments were expressed in the paper by Salerno et al (2018) which found that a general fear of encountering elephants was found amongst local community members. While the indirect costs of Human-Elephant Conflict are at times invisible, the above studies show that these costs can lead to severe ramifications.

2.4 Management and Mitigation of Human-Elephant Conflict

Human-Elephant Conflict is a phenomenon that occurs mostly where human settlements may intersect with elephant ranges (Hoare 2001). These human settlements are usually found in rural settings with inhabitants who are often disenfranchised and heavily dependent on income from subsistence farming (Pozo et al 2017, DeHoon and Motts 2012, Masunga 2007 and Mosojoane 2004). The existing economic and social context of rural communities, therefore, presents them as more vulnerable victims of Human-Elephant Conflict on whom the impacts of Human-Elephant Conflict are more pronounced. Because of the potential for loss of life and dangers of the persistence and increase of Human-Elephant Conflict, it has been identified in several studies that management of Human-Elephant Conflict is of high conservation concern (Neupane et al 2017, Dublin and Hoare 2010, Zhang and Wang 2003, Tchamba 1996). This is further complicated by the endangered and vulnerable conservation status of the Asian and African elephants, respectively.

There is, therefore, a conflicting need to conserve the elephant as an endangered and vulnerable species while also protecting people from loss of agricultural produce, livelihoods, and life. As such, the management and governance of Human-Elephant Conflict are especially important because of its paramount role in defining the future of the elephant species (Hoare and Dublin 2010) as well as the quality of life experienced by already disenfranchised local residents who co-exist with elephants (Mayberry et al, 2017). It must be noted that Human-Elephant Conflict can never be completely eradicated but that effective management will reduce the conflict to a bearable threshold for local communities (Dublin and Hoare 2004). Kangwana (1995) argued, none the less, that determining the level of damage and loss that is tolerable would be challenging as tolerance is a relative and not a fixed factor. Considering these layers of

complexity, Dublin and Hoare (2010) argue that the management of Human-Elephant Conflict will be “as much an art as a science”.

There are several strategies employed by wildlife officials, local communities, and individuals alike to mitigate and manage the impacts of Human-Elephant Conflict. While it is the case in some countries that humans and elephants will continue to share the same resources, some measures have been put in place to minimise the risk of conflict between the two species. There are many calls in the literature for strategies that are not simply symptomatic but that address the root causes of Human-Elephant Conflict (Desai and Riddle 2015 and Jackson et al 2008). Studies have shown, however, that many of the measures being employed to date are symptomatic and aimed at relieving the affected local communities of the impacts of Human-Elephant Conflict (Martin 2019, De Motts and Hoon 2012, Jackson et al 2008,). In this section, these measures will be divided into Traditional Methods of Managing Human-Elephant Conflict, Conventional Methods of Managing Human-Elephant Conflict, and Locally Adapted Deterrent Methods and will be used to understand existing responses to Human-Elephant Conflict.

2.4.1 Traditional Methods

According to Fernando et al (2008), traditional methods are methods that are cheaper to employ, easier to use, and are more effective when levels of conflict are low. Some traditional methods cited in this study include crop guarding, chasing elephants through the use of loud noises, the beating of drums, utilisation of various forms of light, the use of trained elephants and trained people, and the erection of biological and electrical fences.

Culling and shooting of problem elephants responsible for crop-raiding are traditional strategies that were employed in the late 20th century as a means of reducing elephant populations (Botswana Department of Wildlife and National Parks, 2012 and Tchamba 1996). The shooting could take the form of “wet season safari hunting” (Tchamba 1996) and the killing of identified problem individuals (Sitati and Wallpole 2006). Taylor (2004) argued that governments in Southern Africa often relied too heavily on the shooting of problem animals than seeking to understand and address the underlying causes of Human-Elephant Conflict. Jackson et al (2008) describe such an approach as symptomatic. Sitati and Wallpole (2006) dismissed this strategy as ineffective because while it removed individual unruly elephants, it

did not discourage problematic behaviour in remaining herds. These strategies do not, therefore, contribute to any long term and sustainable solution to Human-Elephant Conflict.

2.4.2 Conventional Methods of Managing Human-Elephant Conflict

One form of the conventional method utilised to manage Human-Elephant Conflict is the use of compensation schemes by governments. In general, compensation involves reimbursing affected individuals for the loss of crops or infrastructure as a result of elephant activity. In Kruger National Park, compensation comes in the form of the Kruger National Park paying for the funeral costs of an individual who is killed by wildlife (DeMotts and Hoon, 2012). Jackson et al (2008) describe the strategy of compensation as symptomatic and not effective in addressing the root cause of Human-Elephant Conflict. In Botswana, where the Department of Wildlife and National Parks is the authority over wildlife and national parks, compensation schemes are utilised as one of the means of addressing Human-Elephant Conflict (Stevens 2018 and Mayberry et al 2017).

Compensation for loss or damage as a result of wildlife pre-dates independence from colonial rule in Botswana (30 September 1966) (DeMotts and Hoon 2012). During the British colonial rule, owners and occupiers of land were entitled to kill wildlife that caused damage or loss. The affected parties would then be expected to handover all trophies from this hunting and be compensated for it (DeMotts and Hoon 2012). Following independence, the policy of compensation was maintained in the Fauna Conservation Act of 1979 which gave farmers the right to kill wildlife if it posed a threat to livestock. This resulted in the abuse of the policy. As a result, financial compensation for damage was introduced. When one has experienced loss or damage as a result of elephant activity or any other form of wildlife, they can report this to the local DWNP offices and complete the compensation form (Jackson et al 2008). The form requires that the complainant explain what has transpired and describe the extent of loss (pers comms Department of Wildlife and National Parks official, 2019). The DWNP will then calculate the amount to be paid to the complainant, if any, for the damage and loss incurred (Stevens 2018). DeMotts and Hoon (2012) found that between April 2005 and July 2007, 614 out of 669 conflict reports were addressed by DWNP within three months indicating a relatively effective response mechanism.

There are still reports of the ineffectiveness of the compensation strategy in Botswana (Pozo et al 2017). The first of the problems associated with compensation is with the activity of completing the conflict forms (Gross 2019 and DeMotts and Hoon, 2012). Some members of the rural local communities are illiterate and therefore, cannot fill in the forms provided by DWNP. The individuals then must rely on DWNP officials to complete their forms based on narration resulting in similar accounts of Human-Elephant Conflict being recorded which lacks the detail of the lived experience (Gross, 2019 and DeMotts and Hoon 2012).

Studies by Jackson et al (2008) and Mosojoane (2004) found that some members of the local communities would not report incidents of Human-Elephant Conflict to the Department of Wildlife and National Parks in Botswana as they lambasted the laborious bureaucratic processes and delays in receiving compensation. Some local residents of Northern Botswana have expressed that they no longer report incidents of conflict as often it takes too long to receive compensation and that when the compensation is given by DWNP, it does not compensate farmers of remote areas for the money spent traveling to DWNP offices (Pozo et al 2017 and DeMotts and Hoon 2012). It was further noted that the compensation does not cover the full cost of the loss and damage experienced (Jackson et al 2008). Jackson et al (2008) found that the compensation scheme was a symptomatic approach and that farmers would experience an 11% loss in profit following compensation as a result of raided crops.

DeMotts and Hoon (2012) describe the strategy of compensation as paternalistic control of natural resources. They further argue that the uniform format of the forms normalises the vastly different community experiences of Human-Elephant Conflict and in so doing undermines the destruction experienced. They argued that amongst other factors, government compensation was slow and cumbersome, open to abuse through corruption, and was inadequate in addressing the social and emotional damages brought on through Human-Elephant Conflict. It was argued therefore that mitigation of Human-Elephant Conflict on a governance level should incorporate local communities, a variety of methods, and should be adapted to a local scale (1-10metres) to ensure effective mitigation to tolerable levels for local communities (Hoare 2012).

Sitati and Wallpole (2006) argue that compensation is ineffective since it is difficult to administer, does not lead to a reduction in Human-Elephant Conflict, and that precedent exists for compensation schemes that were abandoned as ineffective. A similar statement is echoed in the study by Gross (2019). DeMotts and Hoon (2012) argue that the government of

Botswana, by administering compensation, exhibit a lack of consideration for the varying costs associated with wildlife where some of these costs are intangible, difficult to quantify, and borne mostly by local communities. Mayberry (2017) echoed this by showing that the impacts of Human-Elephant Conflict are at times hidden and as a result not compensated for. Some of these impacts include restriction of free movement and the psychological effects of living in fear of large animals.

Furthermore, Taylor (2004) shows that compensation schemes present a missed opportunity for the tracking of conflict occurring in the local districts. By recording all reported conflicts, the local DWNP district offices can gain an understanding of spatial and temporal patterns of Human-Elephant Conflict occurring in a local context and use these to inform future management strategies. The potential for modelling of impact is echoed by Pozo et al (2017). Modelling will enable managers to predict areas of highest Human-Elephant Conflict risk and adopt more proactive, localised strategies based on this information (Pozo et al 2017).

Other conventional methods often employed by governments and local wildlife authorities include the culling of problem elephants, translocation of elephant herds, introduction of Community Based Natural Resource Management programmes, and educating communities on co-existing with wildlife (Gross 2019, Pozo et al 2017, Masunga et al 2007, Hoare et al 2004). These methods are adopted in countries such as Botswana, Namibia, Zimbabwe, Kenya, and some Asian countries including Indonesia and India.

2.4.3 Locally Adapted Deterrents to Elephants

Locally adapted deterrents are those that are developed by communities in response to Human-Elephant Conflict in their areas (Fernando et al 2008). The locally adapted deterrent methods, therefore, differ based on the area in question. In China, for example, some locally adapted deterrent methods include improving protected areas to encourage elephants to make use of protected areas as well as planting crops that are disliked by elephants (also referred to as ‘cash crops’) (Fernando et al 2008). In Indonesia, on the other hand, some locally adapted strategies include the taming of elephants in Elephant Training Centres albeit the survival of elephants in these centres is low (Fernando et al 2008).

In Africa, some deterrent methods employed include the planting of a buffer zone of unpalatable crops between settlements and protected areas (Fernando et al 2008). Other methods utilised include the use of the sound of African honeybees as well as the burning of chilli and dung (Fernando et al 2008). In other cases, mobile phones are utilised as a means of early detection and warning of members of the local community (Graham et al 2015). The use of mobile phones in early detection and warning, however, relies on a stable network connection which would not always be the case in rural areas in Africa. The use of unmanned aerial vehicles, which was tested in Tanzania, may be more effective in warding off elephants when considering network-related problems that could be experienced with mobile phones (Hahn et al 2017).

2.5 Conclusion

Human-Elephant Conflict is a phenomenon that occurs at the intersection and interface of elephant ranges and human settlements. Human-Elephant Conflict has existed for several decades due to humans and elephants sharing resources and land in Asia and Africa. The nature of Human-Elephant Conflict globally is, therefore, varied, long-term, at times confrontational and at other times results in financial and other costs. Several factors are attributed to Human-Elephant Conflict including changes in land-use patterns, rainfall and seasonality, the ‘Male Behaviour Hypothesis’, and changes in elephant migratory patterns. For this mini-dissertation, only the role of the location of settlements near protected areas as well as the location of human settlements near elephant migratory routes (far from protected areas) was further discussed. The location of human settlements near protected areas, as well as near elephant migratory routes (far from protected areas), was found, in the literature, to inevitably lead to Human-Elephant Conflict. It must be noted, however, that more studies have been undertaken where Human-Elephant Conflict is caused by human settlements being in proximity to protected areas versus where settlements are far from protected areas. This indicates a gap in knowledge of the nature and impact of where Human-Elephant Conflict occurs far from protected areas.

Impacts of Human-Elephant Conflict are varied and far-reaching including loss of crops from crop raiding, damage to infrastructure including fences and water tanks, and loss of life. For this thesis, the impact that was investigated was how Human-Elephant Conflict impacts on the livelihoods of communities who do not live near protected areas with a specific aim of

assessing how government interventions inhibit or enable livelihoods as per the Sustainable Livelihood Framework.

Several methods are employed both by local communities and governments for the tolerance and management of Human-Elephant Conflict. The measures employed by local communities include traditional methods that are cheaper and easier to employ as well as locally adapted measures that are specific to the severity and extent of Human-Elephant Conflict in their areas. Some traditionally utilised and locally adapted deterrence methods include the placing of chilli on the fence to deter elephants (although this can be funded by government departments), drum beating, communal agricultural practices, and utilising bees. Conventional measures often employed by governments include the culling of problem elephants, translocation of elephant herds, compensation to affected parties, the introduction of CBNRM programmes, and educating communities on co-existence with wildlife.

Studies into Human-Elephant Conflict in Botswana have largely been concentrated in the northern reaches of the country including the eastern panhandle of the Okavango Delta and Chobe River areas. However, Human-Elephant Conflict in the southern sections of the country particularly in the Central District has not been widely explored and investigated. The impacts of Human-Elephant Conflict need to be investigated in these areas particularly as these areas appear to have only begun experiencing Human-Elephant Conflict in the last 10 years (i.e. Since the year 2012) and in some areas, settlements are not located near protected areas. Studies into these areas provide a unique view into how relatively recent Human-Elephant Conflict located far from protected areas affects the livelihoods of local communities.

3. METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used in this dissertation. Qualitative approaches were utilised in the analysis of the data collected. Qualitative methods were utilized because of their strength in unravelling and delineating complex social phenomenon and explaining what the phenomenon is like in practice (Dougherty 2017). Since very little research has been undertaken in the Central District of Botswana particularly as it relates to the relatively recent Human-Elephant Conflict occurring in villages in the area, a qualitative methodology was selected as the most appropriate type of methodology as it would aid the researcher in better understanding Human-Elephant Conflict from the perspective of the local community (Rosenthal 2016)

3.2 Research Approaches

Approaches in qualitative research were utilized for this mini-dissertation and to achieve the aims and objectives of this research. One of these approaches was the grounded-theory approach which relies on the lived experiences of people studied. The grounded theory approach was used as a starting point for developing an understanding of Human-Elephant Conflict in the Central District and specifically in Mmashoro Village.

Some of the pioneers of grounded theory research included Anselm Strauss and Juliet Corbin (Strauss and Corbin, 1994) who described it as a method of generating theories based on data that has been meticulously collected. The development of theories occurs iteratively throughout the research process through continuous interaction between the collection of data and analysis of the collected data (Strauss and Corbin, 1994). Grounded theory is utilised when there is very little known about the subject area and topic and where new, undiscovered theories must be generated (Strauss and Corbin 1994). The method, therefore, aims to uncover relevant conditions under study and to understand how different subjects of the research respond to changing conditions and to the consequences of these changes (which may include the consequences of their actions) (Charmaz and Belgrave 2007). The theory has been widely applied in qualitative research including in the policy arena, in the management of hazardous pregnancy, negotiation, and in the management and control of information (Strauss and Corbin

1994). The grounded theory approach, was, therefore, an ideal approach in this research as minimal data was available for Human-Elephant Conflict in the area.

Data collection when utilising the grounded theory approach must be varied as this contributes to a cohesive set of concepts that aid in providing a comprehensive explanation of the social issues under study. According to Strauss and Corbin (1994), the varied nature of data collected gives the theories developed a level of "richness". There are several ways of collecting data for the grounded theory method including but not limited to: interviews and observations, government documents, newspapers, and letters. The principles of change and determinism form the foundation of the method and drive its results. Change is incorporated into the method through the iterative process and interplay between collected data and analysis of the collected data to inform the next collection of data. Determinism forms part of the method through the investigation and understanding of actors and their roles.

The grounded theory method was considered an appropriate methodology for data collection for this research because of the limited information available on the study area and the concept of relatively recent (i.e.. In the past 10 years) Human-Elephant Conflict as well as Human-Elephant Conflict outside of protected areas. As such, the data collected during this research had to be utilised to form theories and explain the observations made. The data that informed this research was based on documentary evidence of government interventions on Human-Elephant Conflict in the Central District, individual interviews with farmworkers, farm owners, and Mmashoro village residents. The variety in the data collected was utilised to obtain the richness that the grounded theory method offers. Interview questions that guided the interviews that were conducted were developed by the researcher through consultation with the supervisor of the research project. One assistant was enlisted to assist with the translation of some English words into Setswana for local farmworkers and residents. This assistant was trained and supervised by the researcher and all interviews were conducted in the presence of the researcher.

Interviews with local village residents, farmworkers, and farm owners were undertaken, Interviews were conducted in June 2018 by visiting Mmashoro Village and the two farms whose owners gave permission. In June 2020, interviews were undertaken with three additional farm owners and farm workers via telephone. Interviews were chosen as the means to obtain the individual lived experience of farmworkers and village residents and to understand their

perception, opinions, thoughts, and views on the Human-Elephant Conflict they are subjected to (Rosenthal 2016). The interviews were selected over focus groups as the researcher intended to obtain a diverse understanding of the individual experiences where Human-Elephant Conflict is concerned as opposed to obtaining the interaction between different individuals of the community which is the intention of focus groups (Rosenthal 2016).

Although questionnaires would have provided a larger indication of consensus in the sample and would have formed a strong base for the interviews conducted (McGuirk and O'Neill 2016), these were not selected due to the small sample size available; only a small sample of individuals in the community agreed to be interviewed and to answer questions. Furthermore, questionnaires require a certain level of literacy which some of the respondents did not have. To avoid discriminating against illiterate participants, questionnaires were set aside.

Lastly, the Sustainable Livelihoods Framework was utilised to determine how government interventions in the Central District are enabling or constraining the attainment of sustainable livelihoods by those affected by Human-Elephant Conflict in the Central District. This approach was chosen as those affected by Human-Elephant Conflict (farmworkers, residents, and farm owners) varied in their roles in the community and as such, the impacts of conflict on their livelihoods varied (Scoones 1998). By utilizing this approach, this research would be able to differentiate how government interventions impacted each role players' ability to attain a sustainable livelihood.

3.3 Data Collection and Sampling

3.3.1 Gathering of Documentary Evidence

Documentary evidence was obtained from several sources including online articles, policy documents, government publications and directives, as well as editorial opinion pieces on Human-Elephant Conflict. These sources of data provided a layer of richness as they afforded the researcher a lens into relatively recent interventions of government and impacts on local communities and thereby contributed to the richness required by the Grounded Theory approach. Some of these sources were specific to the Central District which contributed to an increased understanding of Human-Elephant Conflict in the area.

The documentary evidence was assessed using the Social Network Analysis wherein the roles of different stakeholders was determined and calculated. This was done to assess how government interventions may be inhibiting or enabling the livelihoods of local communities. To understand the dynamics of stakeholders in Human-Elephant Conflict, an elementary version of Social Network Analysis (SNA) was utilised. SNA is a useful tool when studying behavioural and social relationships as it reveals the patterns and constructs of the relations between different stakeholders (Freeman, 2004). Since communities are comprised of different stakeholders with different influences, interests, and impacts on the social fabric of the community, SNA was useful in unravelling and understanding the role of different actors in the Human-Elephant Conflict narrative in the Central District, the study area.

During interviews conducted, the different actors were asked to name the stakeholders they considered to be influential in the Human-Elephant Conflict. The prevalence of particular actors in each sector was analysed to determine which actors were considered to have the most decision-making power. The actors who were named often then became the centre of the network (Freeman 2004). As such, SNA was used to understand the rank and importance of actors in the Human-Elephant Conflict narrative.

3.3.2 Farmworker and Household Sampling

Household and farm-worker interviews were used to obtain qualitative data about the local perception of Human-Elephant Conflict. Semi-structured questions were utilised for the interviews. This is because this type of interview allows for pre-formulated questions while still allowing for flexibility in the responses of the respondent as opposed to “yes-no” responses (Longhurst 2003). The method of semi-structured interviews allowed for the interviews to unfold liberally and allowed respondents to respond based on their lived experiences and feelings on the topic of Human-Elephant Conflict (Schmidt 2004). The use of semi-structured questions during interviews would allow for a richer, layered response to the objectives of the study which are listed in Chapter One of this thesis. Since the objectives were relatively open-ended, the use of semi-structured questions would allow for varied and richer responses to the aims and objectives of this study thereby contributing to the richness required by the Grounded Theory approach. Interviews were undertaken in June 2018 on a Monday and Tuesday morning and the second round of interviews were undertaken in June 2020 via telephone (this was due to COVID-19 restrictions in Botswana). The interview time in June 2018 was between 10 am

and 3 pm as these were the times when farmworkers had concluded opening the kraals for the cows they herd and before they had to herd the cattle back to the kraals in the evening. The days during which interviews were selected based on the days that suited most respondents.

The selection of farmworkers who were interviewed was based largely on the individuals willing to be interviewed. The profile of farmworkers interviewed was approximately 83% males who were between the ages of 16 and 40. These individuals were chosen due to their roles in the farms and the need for them to often travel long distances herding cattle which meant the possibilities of encountering elephants were greater. Due to the negative relationship between the local government Department of Wildlife and National Parks and the local community, some potential participants were not willing to partake as they assumed that this study was government-affiliated and their responses would not be anonymous.

Local residents interviewed were between the ages of 50 and 70, were mostly males, and were chosen based on the role they played in the village if any. The researcher was also compelled to choose participants liberally due to the fear prospective participants had of participating in the interviews.

Farm owners chosen to participate in the interviews were those who formed part of the Mmashoro Farmers Forum – a group established to lobby the government to intervene in issues of Human-Elephant Conflict in the Mmashoro Village area. The farm owners who were interviewed were 80% male, all were based in the capital city Gaborone, and owned farms near the Mmashoro Village area.

3.3.3 Sampling

The type of sampling utilised for the study was purposive sampling as the number of participants was decided by the researcher based on the objectives of the study and the topics to be addressed in this study. According to Laerd (2012), although the sample chosen through purposive sampling is not representative of the population, this is not considered a weakness as it contributes to the qualitative data being generated. As such, the sample was limited to workers from five farms, residents from Mmashoro Village who agreed to be interviewed, and farm owners who owned farms in the Mmashoro Village area and were part of the Mmashoro Village Farmers Forum.

If more participants had been willing to participate, then sampling based on a 10 farmworkers to 1 farm owner ratio of 10:1 would have been implemented. This is because farms in the area typically had about ten farmworkers as opposed to fewer local residents who remained in the Mmashoro Village outside the farms.

Interview questions centered around the individual's background as it related to the Mmashoro Village, their understanding of Human-Elephant Conflict, and their lived experience with Human-Elephant Conflict. Questions were also asked about the role of governance in alleviating Human-Elephant Conflict and the impact of conflict on their livelihoods.

When undertaking interviews, participants were approached and requested to participate. If they agreed, the research project and aims were explained to participants who were allowed to opt-out. All questions were asked in Setswana as most participants were not fluent English speakers. The results of the interviews were then transcribed from Setswana to English for this thesis report.

Interviews were separated into interviews with farmworkers, residents in the Mmashoro Village, and farm owners. Different questions were asked of farmworkers, residents, and farm owners as per the role of each group in the local community. In 2017, 20 Farmworkers (code utilized: FW), two farm owners (code utilized: FO), and two residents (code utilized: LR) were interviewed. The sample size and ratio of farmworkers to farm owners to residents interviewed was determined by the understanding that there were more farmworkers per farm owner. The three farms that were chosen each had an average of about 10 farmworkers (partners and children above 16 were included in this count). Due to COVID-19 restrictions in Botswana and the inability to revisit the area, three additional farm owners were interviewed via telecom making their total number of farm owners interviewed five. Ten additional farmworkers from these farms were also interviewed. In total 40 people were interviewed for this research and with a population of 1 543, this sample size is considered representative and adequate for this mini-dissertation. Forty people were interviewed as no additional people accepted to be interviewed. Many respondents were not willing to be interviewed and declined our requests for an interview.

Table 1: Table defining the different categories of people interviewed

Farmowners-(Code: FO1-5) - n=5 individuals who owned the farm near Mmashoro Village but resided in the capital city Gaborone		Farmworkers (Code: FW1-30) – n=30 individuals who worked on the farms located near Mmashoro Village		Local Residents (Code: LR1-5) – n=5 – individuals who resided in Mmashoro Village permanently and were usually retired	
Code	Gender	Code	Gender	Code	Gender
FO1	Male	FW1	Male	LR1	Male
		FW2	Male	LR2	Female
		FW3	Male	LR3	Male
		FW4	Male	LR4	Male
		FW5	Male	LR5	Female
		FW6	Male		
		FW7	Male		
		FW8	Female		
		FW9	Female		
FO2		FW10	Male		
		FW11	Male		
		FW12	Male		
		FW13	Male		
		FW14	Male		
		FW15	Male		
		FW16	Female		
		FW17	Male		
		FW18	Male		
		FW19	Male		
		FW20	Female		
FO3	Male	FW21	Male		
		FW22	Male		
		FW23	Male		
FO4	Male	FW24	Male		

		FW25	Male		
		FW26	Male		
FO5	Female	FW27	Female		
		FW28	Male		
		FW29	Male		
		FW30	Male		

3.3.5 Secondary Data - Data Collection from the Department of Wildlife and National Parks (DWNPs), Gaborone

Data was provided to the researcher by DWNPs following a request for data submission. The data was received electronically via email and consisted of a fraction of the data requested. Data was also received from the online Statistics Botswana portal particularly as it related to income in the Central District and the number of workers in the agricultural sector. The following table presents the data requested and the data received:

Table 2: Data received from DWNPs and Statistics Botswana

Interview Topics Per Group		
Data Requested	Data Received	Data Received from Statistics Botswana
1. Human-Elephant Conflict reports from 2012 to 2018; 2. GPS coordinates of where conflict has been reported as they correspond to the reports in point 1 (if these are unavailable, a general location of the conflict would be appreciated); 3. Policy documents relating to Human-Elephant Conflict (in .pdf or word format); 4. Any maps that the Department may have of the Mmashoro and Mmalatswae areas (in shapefile, jpg, pdf, or qGIS format);	Number of Reported Human Conflict Incidents from 2013 to 2017	Rainfall in the Central District Number of workers in the agricultural sector in the Central District Salary of workers in the agricultural sector in the Central District Type of farming activity in the Central District

<p>5. Shapefiles (.shp) of water features (rivers, streams, or stormwater channels) in the area;</p> <p>6. A list of known wildlife occurring in these areas;</p> <p>7. Census data of elephants known in the area from 2000 to 2018 (or any available elephant census data). This may be in excel (.xcl) format;</p> <p>8. Any information about the migratory pattern or movement patterns of elephants in the area (can be in word, pdf, or shapefile);</p> <p>9. Recent observations that the government has made regarding Human-Elephant Conflict in these areas;</p> <p>10. GPS coordinates of the Mmashoro and Mmalatswae areas;</p> <p>11. Census data of human population in Mmashoro and Mmalatswae;</p>	<p>Census of elephants in Central District from 2001 to 2013 (data provided for available years).</p>	
---	---	--

3.4 Data Analysis

For this mini-dissertation, primary data collected through qualitative approaches and secondary data were triangulated to answer the objectives of the study. Thus all analyses undertaken were to triangulate the primary data with secondary data received.

3.4.1 Quantitative Data Analysis

All data from DWNP and Statistics Botswana were plotted using Microsoft Excel (Microsoft Office 365 Suite, 2019). Because of the minimal data points as well as gaps in the data, graphs were plotted (See Chapter 4 of this report) with the available points and used to observe trends

(Microsoft Excel, 2016). This was done by inputting the data into Microsoft Excel columns and then selecting 'insert graph'. The independent variable (ie. Time in years) was placed on the x-axis while the dependent variable (ie. Reported Human-Elephant Conflict incidents in Central District and the Elephant population in Central District).

3.4.2 Qualitative Data Analysis

Data collection when utilising the grounded theory approach is an iterative process that results in data analysis at the initial stages of data collection (Corbin and Strauss 1990). This allows the researcher to analyse the data whilst in the data collection phase and collect data per the results of initial analyses. Similar results were grouped into categories to show the similarities and disparities between similar results. The different categories were then coded using open coding. Strauss and Corbin (1990) explain the different benefits of using open coding as:

- It allows for data to be separated analytically
- It removes the bias that could arise from the researcher
- It allows for an analysis of similarities and differences

The Sustainable Livelihoods Framework was then utilized to assess how government interventions constrain or enhance the livelihoods of actors affected by Human-Elephant Conflict in the Central District. This framework was utilised as it assists in grouping the factors that constrain or enable livelihoods and indicates the relationship between the factors (Pandey et al 2016). The five-step assessment process adapted from in Scoones (1998) were utilised:

For this mini dissertation, the following steps were taken in determining how government interventions constrained or enabled sustainable livelihoods in the Central District:

- An assessment of the policy environment with regards to Human-Elephant Conflict
- An analysis of livelihood resources available to residents, farmworkers, and farm owners in the Central District
- An analysis of how institutional instruments, including government interventions, influence access to livelihood resources
- An analysis of livelihood strategies and pathways (including current strategies to obtain a livelihood)

- An analysis of the resultant livelihoods and sustainability of the livelihoods

3.4 Ethical considerations

Because the farmworkers in the study were under the employ of farm owners, I had to introduce myself to the farm-owners and inform them of my study and the aims and objectives. I then had to obtain permission from the farm owners to interview them and their workers. Following this, I asked for the permission of the workers. Since many of them are of Sesarwa descent, I had to communicate with them in Setswana as a means of also obtaining their trust. Residents of Mmashoro Village were approached at their homes and asked if they would like to participate through interviews. Only those who acceded to the request were interviewed in Setswana. An ethics clearance certificate was granted by The University of Cape Town for this study following receipt of a Research Permit from the Department of Environmental Affairs, Botswana.

3.5 Limitations of the study

Limitations were identified during this research. Firstly, some interviewees believed that the research was a government-led project. Interviewees were, therefore, skeptical about responding. However, this was overcome by explaining to interviewees in Setswana that this was not a government-led project and that their responses would not be attributed to their identities should they wish. Nevertheless, the notion that the research was a government effort prevented some potential participants from participating. Secondly, data received from DWNP was not a complete record as some data had not been entered by the local authority. As such, understanding trends and analysing these trends was limited due to the incomplete nature of the data. Thirdly, stakeholders in the form of government officials could not be interviewed due to time and other constraints. An understanding of the role of government in the Human-Elephant Conflict could not be obtained from government officials. The research had to rely on documentary evidence in this regard.

Lastly, the use of case studies in research presents a limitation. Case study research is often described as being un-replicable, unable to be generalised, biased, and subjective (Idowu 2016). However, Idowu (2016) argues that the case study approach offers an all-inclusive approach to understanding a phenomenon instead of a study into what is termed by Idowu

(2016) as "giving pieces of information about the components". It must be noted that this research utilised one case study area, Mmashoro Village, due to the scope of a mini dissertation. The limitation was overcome by incorporating other sources of evidence including quantitative data and documentary evidence.

3.6 Conclusion

This study into Human-Elephant Conflict in the Central District of Botswana relied mainly on qualitative data and utilised secondary quantitative data and analyses to gain a holistic understanding of Human-Elephant Conflict in the Central District of Botswana and the impacts of this conflict on the livelihoods of those affected. Data was collected from documentary evidence, quantitative data provided by the Department of Wildlife and National Parks, and interviews conducted with different stakeholders namely: farmworkers (FW), farm owners (FO), and residents of the Mmashoro village (LR). Quantitative (secondary) data was sourced from DWNP while documentary evidence was sourced from online sources and statistical data obtained from the Statistics Botswana Online Portal. Quantitative (secondary) data collected from the Department of Wildlife and National Parks were analysed using Microsoft Excel 2016. Graphs were drawn in Microsoft Excel and trends were observed and captured. Qualitative data were analysed using open coding and an elementary Social Network Analysis to gain an understanding of the prevalence of certain phenomena and an understanding of the role of and interactions between stakeholders in the community (see above for how Social Network Analysis was utilised). Lastly, the Sustainable Livelihoods Framework was used to assess how government interventions in Human-Elephant Conflict enable or constrain the livelihoods of those affected by Human-Elephant Conflict in the Central District. The next chapter presents the results of the research.

4. RESULTS

Mmashoro Village and its surrounding farms were selected as the case study area to investigate the nature of Human-Elephant Conflict occurring relatively far from protected areas, relatively recent incidents of Human-Elephant Conflict in the area and the impacts of the conflict on the livelihoods of the affected residents as well as to understand how government interventions have constrained or enabled sustainable livelihoods. The results of the research are presented below and respond to the specific objective presented in Section 1.3 of this thesis. The following are the objectives for which results were collected:

- To understand the nature of Human-Elephant Conflict in the Central District of Botswana;
- To determine how livelihoods of the local community have been affected by Human-Elephant-Conflict in the area, and how members of the community have been responding to the impacts of Human-Elephant Conflict.
- To assess local perceptions of whether the government's response to Human-Elephant Conflict in the area is enabling or prohibiting livelihoods of the local community by comparing government interventions as documented in documentary evidence versus the lived experience of community members affected by conflict.

Coding of Interviewees

Please refer to Table 1

4.1 Understanding the Nature of Human-Elephant Conflict in Central District

Understanding the nature of Human-Elephant Conflict in Mmashoro Village

Results from some of the interviews conducted with farm-owners, farmworkers, and local residents indicate that prior to 2012, elephants were not observed in Mmashoro Village and surrounding farms (FO1-3, LR1-5, FW3, 7, 9, 15-17, 26, 2018 and 2020). As a result, incidents of Human-Elephant Conflict, which in Mmashoro Village occur as destruction of fences and farm equipment by elephants, were not occurring prior to 2012. After 2012, incidents of Human-Elephant Conflict began increasing gradually. Initially, some farm owners and local residents reported that between 2012 and 2017, Human-Elephant Conflict only occurred between the months of September and April (the drier months of the year in Botswana) (FO1-2, LR1-2, FW2-7, 2018).

After 2017, however, incidents of Human-Elephant Conflict in Mmashoro Village and surrounding farms became more frequent and were occurring throughout the year (FO1-FO2 and LR1-LR2, 2018). In fact, most respondents (farm owners, farm workers, local residents) noted that the number of elephants frequenting the Mmashoro Village area had increased since 2017 (FO1, FO2, FO3, FO4, LR3, LR4, FW18, FW19, FW21, 2018 and 2020) which FO4, 2018 indicated that they had first experienced conflict with elephants in 2009. Two farm owners also stated that conflict with elephants had become more confrontational as they noted some elephants “had become stubborn” often refusing to be driven away from farms (FO1 and FO5, 2018 and 2020).

The above result coincides with data received from the Department of Wildlife and National Parks since this secondary data indicated an increase in Human-Elephant Conflict and elephant population in the Central District (Department of Wildlife and National Parks, 2018). As such, the secondary data confirmed that more conflicts and confrontations with elephants were occurring in the Central District (Department of Wildlife and National Parks, 2018). In 2001, the estimated elephant population was 10 113 in the Central District while the elephant density per square kilometer was found to be 0,2 (See Figure 2) (Department of Wildlife and National Parks, 2018). In 2002, the population had reduced to 3 742 while the elephant density per square kilometer was 0,03 (Note: While the available data on elephant populations was provided from the year 2002 for the entire Central District, no data is available on the elephant population of the Mmashoro Village area at any given time. As such, specific data for the Mmashoro village and surrounding farms is unavailable to confirm the results of the interviews) (Department of Wildlife and National Parks, 2018).

The secondary data indicated that in 2012, the elephant population was estimated to be 10 697 with a density per square kilometer of 0,08 (Department of Wildlife and National Parks, 2018). In 2013, the data shows that elephant populations dramatically increased to 33 037 with a density of 0.99 elephants per square kilometer in the greater Central District (see Figure 4 and Figure 5). Data for the elephant population in the Central District was unavailable from the period of 2014 to 2018. As stated above, the secondary data, however, does not indicate the number of elephants in Mmashoro Village and the surrounding farms (Department of Wildlife and National Parks, 2018). Results from the interviews, therefore, provide insight into the presence of elephants in Mmashoro only after 2012 albeit FO5 indicated the presence of elephants from 2009.

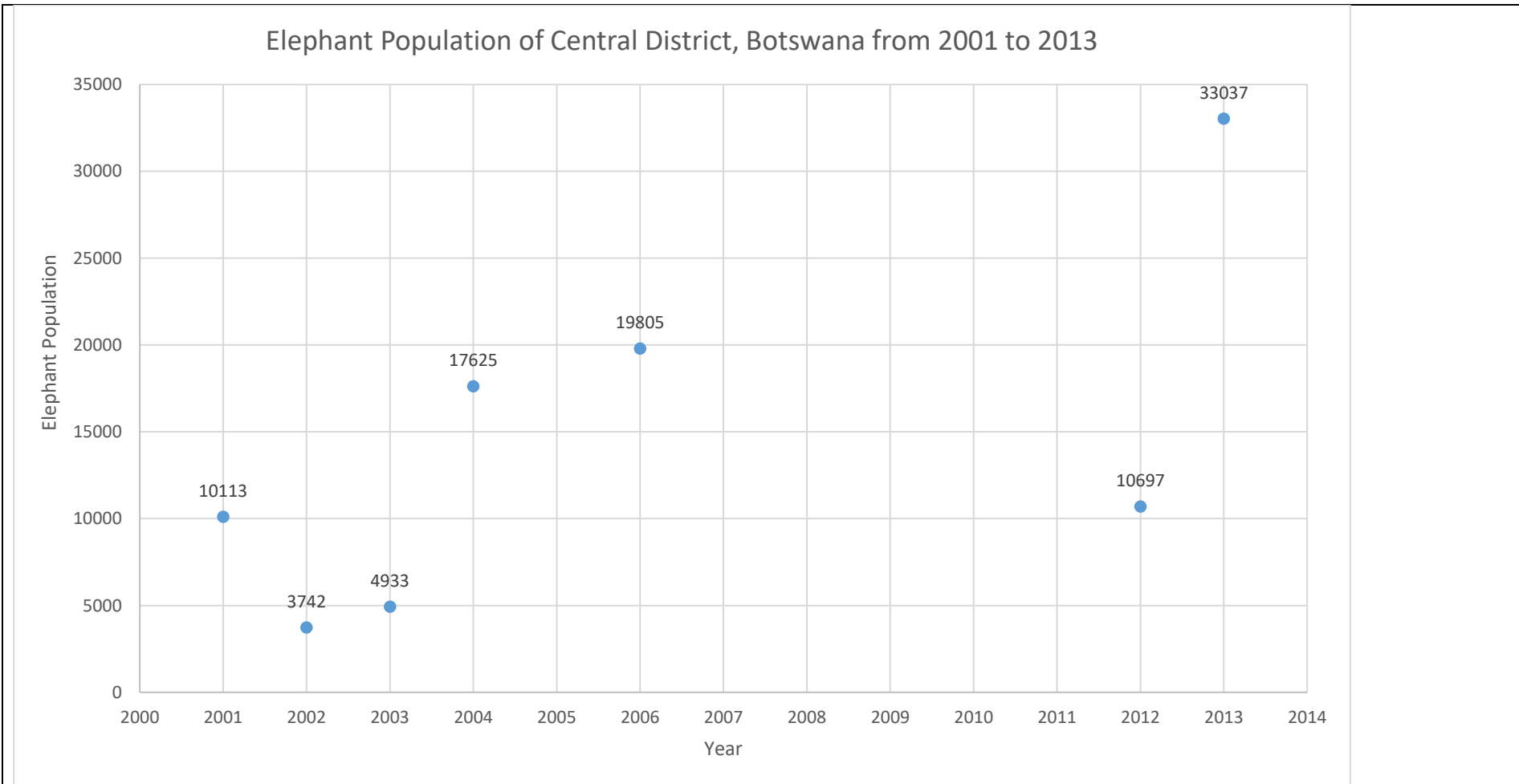


Figure 4: Changes in Elephant Population from 2003 to 2013 in the Central District. A general increasing positive trend is seen in Figure42 which indicates that the elephant population of the Central District has been generally increasing over time (Department of Wildlife and National Parks, 2018).

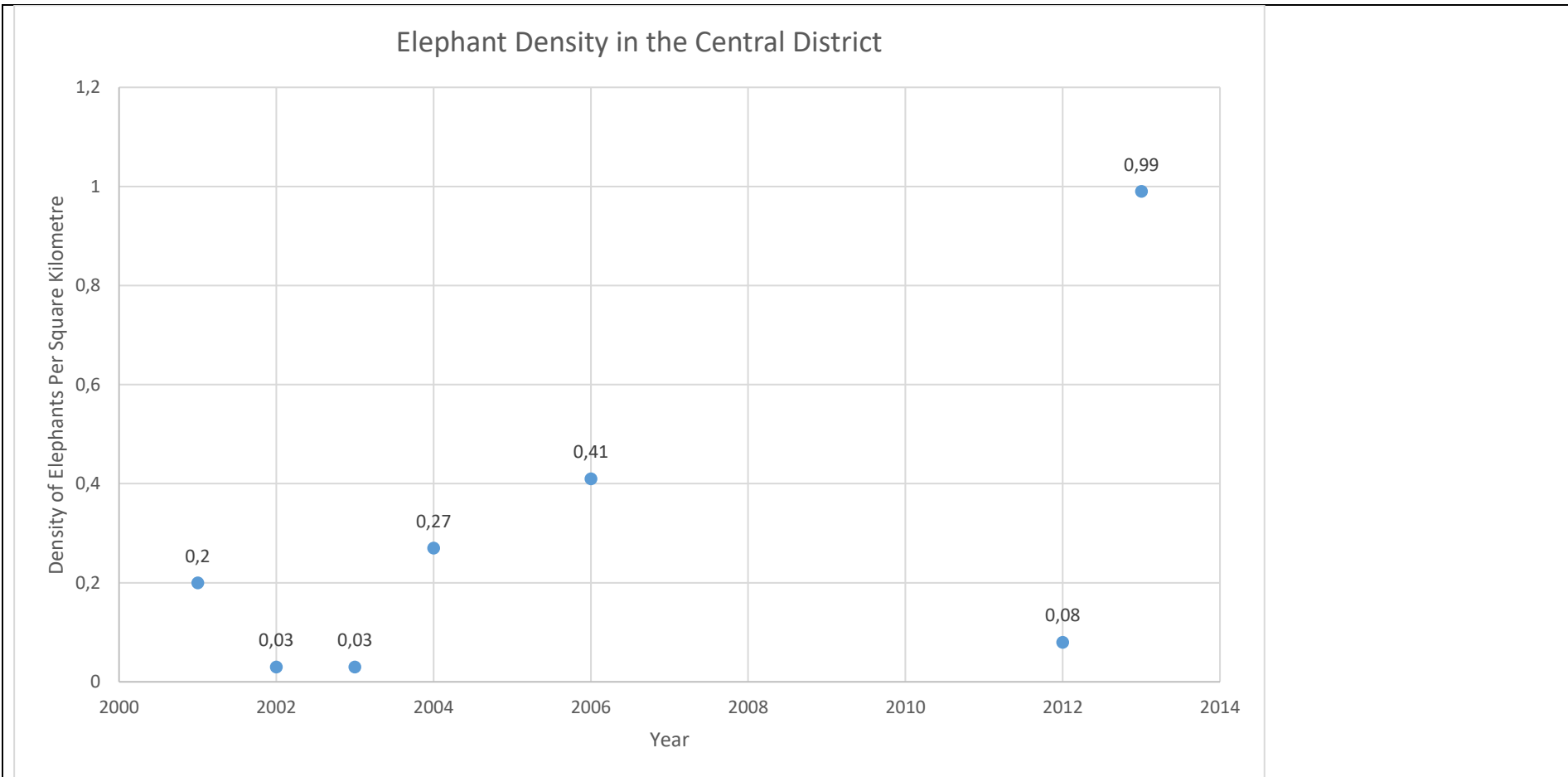


Figure 5: Changes in Elephant Density from 2003 to 2013 in the Central District. A general increasing positive trend is seen in Figure 2 which indicates that the elephant population of the Central District has been generally increasing over time (Department of Wildlife and National Parks, 2018).

The Forms of Nature of Human-Elephant Conflict in Mmashoro Village and surrounding farms

The nature of the Human-Elephant Conflict in Mmashoro Village is influenced by the actors experiencing the conflict and their level of exposure and interaction with elephants. For farmworkers who often travel large distances to herd livestock, they stated that the form of Human-Elephant Conflict was that of potentially encountering elephants when herding, defending farm infrastructure from elephants, and safeguarding their families from potentially encountering elephants (FW1-5, FW9-18, 2018). This is because farmworkers often live on the farms they work in with their families and children.

In the case of farm owners, most of them stated that the nature of Human-Elephant Conflict centered around damage to farm infrastructure, mostly fences (FO1-3 and FO5, 2018 and 2020). The interface at which these actors came into contact with elephants was often not in person but at the point of their farm infrastructure (FO1-3 and FO5, 2018 and 2020). Oftentimes, the nature of Human-Elephant Conflict between farm owners and elephants is that of the destruction of fencing used to demarcate farms (FO1-3 and FO5, 2018 and 2020). The following was stated by one farm owner (FO5, 2020), “The way in which our fences are destroyed depends on the elephants. For example, when it is only mature elephants crossing through, the damage is less. However, when the elephants are crossing with their offspring, they break more sections of the fence. It looks like they do this to allow their children to cross through our farms unharmed” (FO5, 2020). Some of the farm owners interviewed stated that fences were usually the only damaged infrastructure (FO1-3 and FO5, 2018 and 2020). The consequences of this nature of conflict are far-reaching, however, as some farm owners reported an increase in theft once fences were destroyed as well as the loss of livestock and the presence of other wild animals such as leopards entering the farms thereby compounding conflict with wildlife (FO1-3 and FO5, 2018 and 2020).

The nature of the Human-Elephant Conflict between Mmashoro Village residents and elephants is similar to that of farm owners. The nature of the conflict is in the damage made to infrastructure by elephants. However, in the village this damage extends beyond the destruction of fences (LR 1-3, 2018). Most of the local residents stated that elephants would often pierce their JoJo tanks to access water as well as destroy their small gardens and trees within their yards (LR1-4, 2018). One resident stated, “These animals come looking for water. They have pierced my JoJo tank so many times, I will not be replacing it (LR1, 2018).” Furthermore, the nature of the conflict with local residents results in some residents being restricted in their movement (LR4-5, 2018).

In Mmashoro Village, therefore, the nature of Human-Elephant Conflict consists of several layers depending on the actors in question. In general, the nature of conflict in Mmashoro

Village and surrounding farms is that of minimal physical contact and occurs mostly in the form of destruction of fences, restriction of movement, destruction of JoJo tanks, and destruction of home gardens and trees. Unlike conflict in areas of the country such as the Okavango Panhandle where death and injury occur as a result of conflict (Martin 2019 and Pozo et al 2017), the results do not show this to be the case in Central District.

4.2 The Impact of Human-Elephant Conflict on the Livelihoods of Local Community Members

Various types of livelihoods including those of local residents, farm workers, and farm owners, are affected by Human-Elephant Conflict incidents in the Mmashoro Village and surrounding farms. This can be attributed to the fact that Human-Elephant Conflict manifests in different forms within communities (Neupane 2017 and Gubbi 2012). In the Mmashoro locale, Human-Elephant Conflict occurs through the destruction of property in the form of fences, JoJo tanks, and kraals as well as through limiting the movement of community members and farmworkers. It is apparent, therefore that there are variable impacts on the livelihoods of affected parties.

Similar to the nature of Human-Elephant Conflict in Mmashoro District and surrounding farms described above, the impact of Human-Elephant Conflict on the livelihoods of different community members is varied between the different actors in the political ecology of Human-Elephant Conflict in Mmashoro Village and surrounding farms. Some of the farm workers, including the women who would remain while the men reared cattle, stated that the impact of Human-Elephant Conflict was on their emotional wellbeing (FW6-8, FW19-20, 2018). This manifested in a fear of moving (FW6-8 and FW19-20, 2018) and rearing cattle back to the paddocks for the men (FW1-4, 2018). One farmworker stated the following, “I get so scared to go get the cattle back to the paddocks. You never know when you will meet with an elephant and if it will attack you or not. (FW3, 2018)” while another farmworker stated “You see, we live with our families here on the farm. I, for example, have a small baby. I always live in fear of being attacked by elephants (FW16, 2018)” This result from the interviews indicates that the impact of Human-Elephant Conflict on farmworkers is on the emotional wellbeing of farmworkers in the Central District. Results from the interviews also indicate that some farmworkers are responding to conflict through avoidance mechanisms including remaining in their homesteads if they believe an elephant is roaming in the farm they work and live in (FW6-8, FW9-12, FW22, 2018 and 2020).

Farm owners and Local that impacts of Human-Elephant Conflict on their livelihoods were on both their current Residents experienced similar impacts of Human-Elephant Conflict. All of the farm owners stated that Human-Elephant Conflict impacted on their financial livelihood as well as on their ability to make a living from their farms (FO1-5, 2018 and 2020). This was explained by one of the farm owners (FO4, 2020) as the following, “I had to create paddocks to separate different breeds of cows so that I can export the beef of the offspring to the European Union. The European Union requires that I know at all times where the animal to be slaughtered is. What happens then is when the paddock fences are destroyed by elephants, the cows to be slaughtered end up wandering outside the paddocks. I am then unable to sell my beef to the EU as I cannot guarantee the location of my cows and whether or not they bred with a different breed.” This result indicated that the impact of Human-Elephant Conflict was not only in financial terms because of destroyed fences but was affecting farm owners’ ability to make a living in the future (FO4, 2020). Due to their socioeconomic circumstances, interviews conducted indicate that farm owners respond to conflict by lobbying government to intervene. This is evidenced by the formation of the Farm Owners of Mmashoro Lobby Group which holds discussions with the Department of Wildlife and National Parks regarding the exacerbated level of Human-Elephant Conflict (FO1-5, 2018 and 2020).

All of the farm owners also expressed an additional financial impact. Since all of the farm owners live in the capital city of Botswana, Gaborone (approximately 420 km south of Mmashoro Village), they only travel to their farms on average once a month (FO1-2, 2018). Since elephants were destroying their farms on a regular basis, some farm owners were forced to visit their farms more often to undertake repairs to their fences (FO1-5, 2018 and 2020). This additional expenditure on petrol and fencing material was a burden to these farm owners with FO1 indicating that he spent an additional P80 000 (eighty thousand pula) on travel and repair of fences per year.

In the case of farm owners, the biggest impact was the destruction of property from migrating or visiting elephants. Some farm owners in Mmashoro are not residents of the area and are often not in the area when damage to property occurs. The impact on their financial investment as a result of damage to property is therefore that they are required to travel to Mmashoro to inspect damages, travel to the district environmental office in the nearby town Serowe to report the incident to recover financial compensation, and then repair the fences while awaiting the bureaucratic processes for compensation (FO1, 2018). Oftentimes, as lamented by all the farm

owners, the compensation is negligible compared to the amount they have to spend to repair broken fences or to reinstate fences altogether (FO1-5, 2018 and 2020) (Stevens 2018). While it is likely that farm owners have greater financial resources than the residents of the Mmashoro Village, farming in Botswana consists mostly of subsistence farming and as such loss of property reduces the potential financial turnover of farms in the area (Mayberry et al 2017). One farm owner remarked that they spent on average P80 000 (80 000 Botswana Pula) per annum on repairing infrastructure destroyed by elephants. As such, Human-Elephant Conflict threatens the financial livelihoods of farm owners as it affects their structural investments into their farms.

For residents in the area, the impact of Human-Elephant Conflict was on their emotional wellbeing as the presence of elephants in their living areas invoked fear and anxiety (LR1-3 and LR5, 2018). They further experienced financial loss due to damage to their JoJo tanks and fencing (LR1-3, 2018). The haphazardness with which elephants frequent the area prevents some local residents from moving around to access economic opportunities either in the surrounding villages or in the nearest town, Serowe (LR1-4, 2018).

According to Statistics Botswana (2016), in September 2012, the average national cash earnings of workers in the agricultural sector in the Central District was Pula (P) 1233.00. In September 2013, the cash earning of agricultural sector workers in the Central District increased to P1273.00. In the same year, the number of paid employees in the agricultural sector was 6 523. The cash earnings of agricultural sector workers increased to P1 333.00 in September 2014 with the number of workers in the same year reduced to 6 514. The cash earnings in the agricultural sector reduced to P1285.00 with the number of workers increased to 6637 in 2015. In September 2016, the cash earnings of workers in the agricultural sector increased to P1548.00 with the number of workers increased to 6545. In 2017, the number of paid workers reduced to 6 507 with cash earnings estimated at P1597.00. The minimum wage for agricultural workers in Botswana in 2017 was P700 per month. The results presented above indicate that farmworkers, although not directly, may experience impacts on their livelihoods that further disadvantage and disempower their limited resource base.

Farmworkers expressed that the presence of elephants in their living and working environment invoked a sense of fear in them. Oftentimes, workers would be too fearful to move about the farms and even conduct their work in case they would encounter elephants. This had an impact

on their work and their ability to exercise their functions including protecting the herds of livestock they are responsible for. This, therefore, would sometimes lead to the loss of their jobs and as such loss of financial wellbeing. One farmworker (FW3, 2018) noted that “If a cow wanders off and is lost because I was afraid to herd the cattle to the kraals, a certain amount is taken from my wages. It is unfair because it is not my fault.”

Farmworkers also experienced what is described in Mayberry et al (2017) as “hidden impacts”. While the visible impacts of Human-Elephant Conflict are often known and easily identified, the hidden impacts in the form of emotional stress and limits to free-movement are often unknown as they are not quantifiable or tangible. Farmworkers expressed that they experienced a limit to their mobility as a result of the presence of elephants. The lack of mobility meant that at times, farmworkers could not access their food supplies located in a different area of the farm or it would restrict them from visiting their families closer to the village. This had an impact on their physical wellbeing as at times, their access to food services would be limited and cut off for periods until it would be safe to begin moving. Furthermore, this indicates that the impacts of Human-Elephant Conflict are not only limited to those directly impacted but also have an influence on the wider community who depend on farmworkers and other active members of the community for resources.

4.3 Perceptions of Government Management of Human-Elephant Conflict

No interviews were held with government officials to ascertain the government’s role in managing Human-Elephant Conflict in Mmashoro Village and surrounding farms due to a general unwillingness from government officials. Requests for interviews with government officials commenced in December 2017 and continued until June 2018 during which time I was directed to several officials in the Gaborone and Serowe offices who in turn indicated that they would not provide interviews. Requests were made in person at the offices of the Department of Wildlife and National Parks in Fairgrounds, Gaborone, by phone as well as via email to no avail. As such, all results in this thesis pertaining to the role of government are informed by data received during interviews with farmworkers, farm-owners, and local residents of Mmashoro Village, on policy documents pertaining to the government’s role in managing conflict and on documentary evidence in the media (secondary data) reviewed for this dissertation.

4.3.1 Stated Government Responses to Human-Elephant Conflict as documented in Policy Documents

National Policy and Strategy for the Conservation and Management of Elephants in Botswana (Department of Wildlife and National Parks, 2003)

Several policy instruments exist in Botswana that inform how Human-Elephant Conflict is governed. One of these is the National Policy and Strategy for the conservation and Management of Elephants in Botswana was published in 2003 (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003) with several objectives detailed for the management of elephants across the country. The policy is largely an advocacy tool for the conservation of elephants. However, the policy instrument does acknowledge the role of Human-Elephant Conflict in the management and conservation of elephants in Botswana as the policy provides means for managing and reducing Human-Elephant Conflict through “culling, killing of problem animals, and providing incentives to increase tolerance by people for elephants” (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003). The policy was developed from the initial 1993 Elephant Plan. The 2003 policy was thus a revision of the 1993 policy after it was found that the latter’s objectives were not met. These objectives were to control elephant numbers and to minimise the impact of elephants on human livelihoods and habitats. Since the population of elephants had doubled since 1991, an addendum and revision of the policy was necessary.

The National Policy and Strategy for the Conservation and Management of Elephants in Botswana divides the issues associated with the management of elephants into:

1. Aesthetic issues based on a value judgement of the stakeholders most affected by the management strategies. Human-Elephant Conflict is located within this category.
2. Technical issues related to the implementation of the strategies.

The objectives underlying the National Policy and Strategy for the conservation and Management of Elephants in Botswana are as follows (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003):

1. Reduce Human-Elephant Conflict to Acceptable Levels
2. Prevent, Reduce or Reverse Unacceptable Environmental Changes As a result of Elephants
3. Maximise the Utilisation of and Benefits from Elephants
4. Protect Elephants Through Law Enforcement
5. Meet International Obligations
6. Improve Public Awareness of Management Activities
7. Improve Communication and Coordination Within and Between Stakeholders and Role Players
8. Acquire Adequate Information for DWNP to Manage Elephants Effectively

This strategy recognises elephants as dangerous animals and permits locals to kill elephants should they damage or threaten to cause damage to property (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003). The hides and skin collected from elephants after they have been killed must be submitted to the Government of Botswana: Department of Wildlife and National Parks. Key methods for addressing Human-Elephant Conflict are identified as (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003):

- Killing problem animals
- Eliminating or reducing the elephant population
- Erecting barriers
- Disturbance
- Repellants
- Relocating affected people
- Providing incentives for co-existence with elephants

The policy further states that a combination of these methods would be most effective in managing and addressing Human-Elephant Conflict.

Four primary objectives support this goal (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003):

- Reduce Human-Elephant Conflict to acceptable levels
- Prevent, reduce, or reverse unacceptable elephant-induced environmental changes
- Maximise the benefits from the sustainable utilisation of elephant
- Protect elephants through law enforcement

Five supporting objectives to this goal are (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003):

- Meet international obligations on elephant conservation, monitoring, and management
- Improve public awareness of management tools
- Improve communication and coordination within and between stakeholders and role players
- Acquire adequate information for DWNP to manage elephants effectively
- Improve institutional and technical capacity for management

Reducing Human-Elephant Conflict to acceptable levels is identified in this document as Objective 1. Between 1997 and 2002, the average number of reported conflict incidents were 150 per year (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003). The document further states that the recommendations of the 2001 IUCN African Elephant’s Specialist Group’s Decision “Support System for Managing Human-Elephant Conflict Situations” are to be followed (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003).

Under Objective 1: Reducing Human-Elephant Conflict to Acceptable Levels, four strategies are identified:

Strategy 1: Assess Human-Elephant Conflict cases and put appropriate countermeasures in place

- Set up or improve the Human-Elephant Conflict database
- Maintain comprehensive records of Human-Elephant Conflicts

- Identify focal points for conflicts
- Promote community participation (training etc)
- Encourage and assist affected communities or landowners to address the problem themselves using multiple countermeasures including disturbance of animals, physical barriers, repellents (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003)

Strategy 2: Provide incentives to increase tolerance by encouraging utilisation of elephants while ensuring benefits return directly to affected communities (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003)

- Develop tourist facilities with benefits accruing to communities
- Return benefits from safari hunting in affected areas to communities
- Facilitate live sale of animals with benefits accruing to communities
- Regular cropping of entire herds of elephants at sustainable levels, with proceeds from the sale of products and meat being returned to communities (dependent on economic feasibility)

Strategy 3: Reduce or eliminate elephants as applicable (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003)

- Where applicable, determine the feasibility of reducing numbers
- Reduce numbers
- Where applicable, remove all elephants from the area, prevent fresh immigration by erecting and maintain electric or cable fences and remove any elephants that enter the area

Strategy 4: Compensate affected individuals (National Policy and Strategy for the Conservation and Management of Elephants in Botswana, 2003)

- Write a guideline for circumstances in which compensation is paid
- Set up systems for fair compensation (rapid reaction, damage assessment. Valuation of damage, prompt payment of compensation)
- Record and report incidents and payments

The National Policy and Strategy for the Management of Elephants further identifies the objective of meeting international obligations as objective 5 and identifies the geographic components of management strategies. The geographic components are, however, limited to the Wildlife Management Areas of Botswana mostly occurring north of the study site. In this way the policy is aimed at Human-Elephant Conflict where it occurs in proximity to protected areas. This is not the case for Mmashoro Village which is not located close to protected areas. The strategies described in this policy for the reduction of Human-Elephant Conflict are, therefore, not applicable to the study area. The effectiveness of these strategies for Mmashoro Village is thus questionable. For example, Strategy 2 would not be applicable to Mmashoro Village as elephants in the area do not occur on a permanent basis but rather pass through the area as indicated during interviews. As such, the benefits that could be accrued to locals would not be sustainable or predictable thereby reducing the tolerance the community has for elephants.

Department of Wildlife and National Parks Wildlife Policy (2013)

In 2013, the Department of Wildlife and National Parks adopted a Wildlife Policy (Wildlife Policy, 2013). While the policy addressed various aspects related to wildlife management, the policy also included a section on the management of Human-Wildlife Conflict. In the policy, the management of human-wildlife conflict was identified and categorised as one of the objectives of the policy (Wildlife Policy, 2013). Measures described in the policy for addressing human-wildlife conflict in which Human-Elephant Conflict is included were (Wildlife Policy, 2013):

- Developing and implementing a human-wildlife conflict strategy

- Provide incentives to ensure wildlife tolerance. This could be in the form of sustainable utilisation of resources and ensuring that benefits received from this endeavor are given to the local communities
- Strengthen the Problem Animal Control unit to promptly respond to animal-related issues
- Community awareness and training on wildlife conservation and empower community members to undertake problem animal control on their own
- Encourage the establishment of problem animal ‘sanctuaries’ through the assistance of the private sector

The measures described in this policy are applicable to the Mmashoro Village area. Some of the measures described above are being implemented including community awareness (handing out of information booklets albeit inutile due to illiteracy among some community members). Other measures such as the establishment of problem animal “sanctuaries” does not apply to the Mmashoro Village area as there is no protected area close to the village. Such sanctuaries could be developed where elephants occur on a permanent basis in the village and surrounding farms. Since this is not the case in Mmashoro Village, identifying “problem” elephants to place in sanctuaries would require more extensive and expansive effort.

4.3.2 Documentary Evidence of Government Intervention

Documentary evidence of government interventions has shown that the above-mentioned interventions explained in the policy documentation do not appear to be implemented wholly on the ground. For example, the following Facebook post from the Botswana Government official page presents a recent example of government intervention. The post warns the public of potential elephants in the Mmashoro Area but does not provide measures for the community to repel elephants. Furthermore, this post assumes that Mmashoro Village residents can easily access Facebook which is not likely to be the case given the socioeconomic conditions in the village and surrounding farms as evidenced by the income presented above for farmworkers:

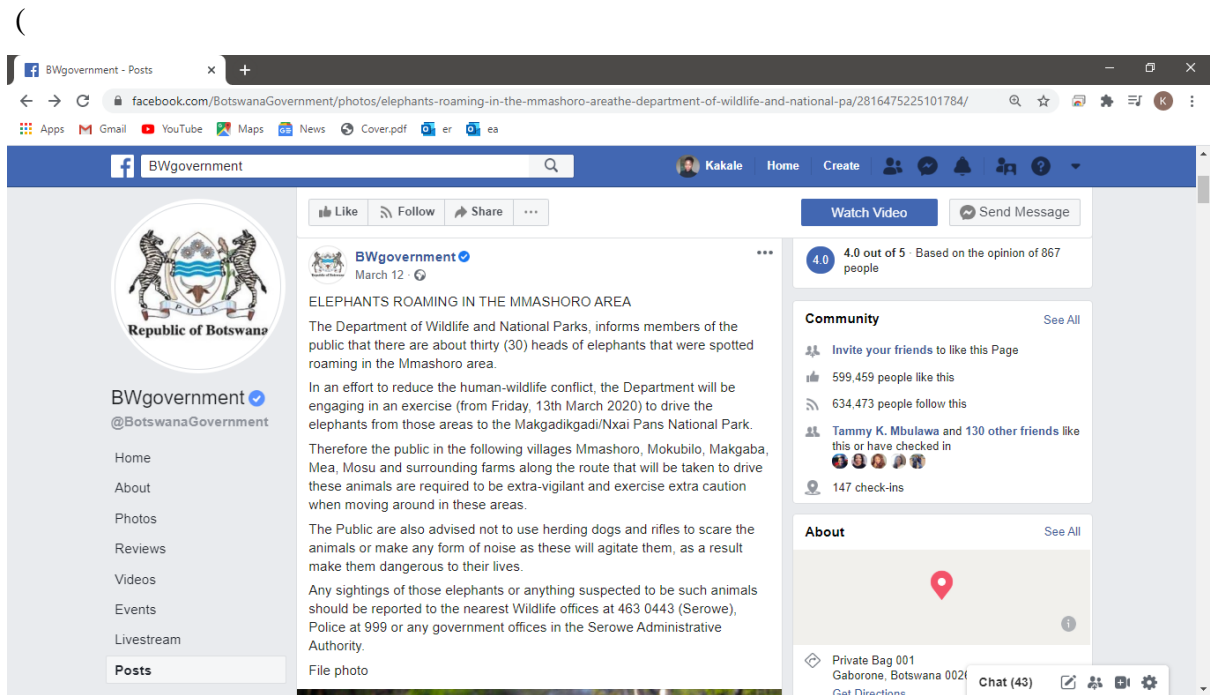


Figure 6: Facebook Post from the Botswana Government Official Facebook Page warning Mmashoro residents of elephants roaming (Government of the Republic of Botswana, 2020)



Figure 7: Brand Botswana Advertising on June 15, 2019 notifying residents that elephants have wandered into human communities. (Brand Botswana, 2019)

4.3.3 Perception of Government Interventions in Human-Elephant Conflict Management

Primary data obtained from interviews conducted indicated that the different groups of people interviewed held similar perceptions of how the government manages Human-Elephant Conflict in Mmashoro Village and surrounding farms. All of the farmowners indicated that the government was not intervening or managing Human-Elephant Conflict currently in any capacity per their perceptions (FO1-5, 2018 and 2020). All of the farmworkers indicated that the management of Human-Elephant Conflict was the Botswana Government's responsibility and that there was no role to be played by farmworkers (FW1-30, 2018 and 2020).

All of the farm owners interviewed indicated that they had knowledge of government intervention but that this intervention was not useful or successful (FO1-5, 2018 and 2020). Farm owners indicated that the Department of Wildlife and National Parks was distributing handbooks in an effort to educate the community about living with elephants (FO1-2, 2018). Two farm owners interviewed indicated that government had recently (as of 2019) provided chilli to farm owners and local community members to assist in repelling elephants from their properties (FO3 and FO5, 2020).

All the respondents interviewed as part of this research agreed that it was the role of the Department of Wildlife in Botswana to rectify the Human-Elephant Conflict being observed in the area (FO1-5, LR1-5, FW1-30, 2018 and 2020). All individuals narrated that this was not a problem they had any role in and that it was the government's responsibility to intervene (FO1-5, LR1-5, FW1-30, 2018 and 2020). A gap or lack of governance was highlighted in the interviews where some farm owners, local residents, and farm workers felt that the government was not efficient in addressing the problem of Human-Elephant Conflict in the area (FO1-5, FW1-5, FW8-15, FW20-27, LR1-5, 2018 and 2020).

Some farm owners and all of the local residents stated that the government was not acting per the government policies (FO1-4 and LR1-5, 2018 and 2020). All of the local residents lamented the fact that the only interventions by government were compensation for those affected by conflict and the provision of information booklets on living with elephants (LR1-5, 2018). Most farmworkers agreed that it was the government's role to manage Human-Elephant Conflict but stated that they did not know how the government was doing this and did not know what the

best solutions would be to manage conflict (FW1-9, FW12-14, FW16, FW21-24, FW28, 2018 and 2020).

The parties who are faced with elephant conflict directly are most often farmworkers and residents in the nearby villages such as Mmashoro Village. The information received from the interviews also highlighted a gap in implementation of policy and plans that need to be addressed by the Department of Wildlife and National Parks (FO1-5, LR1-5, FW1-30, 2018 and 2020).

All farmworkers and residents alike complained about governments lack of action in combatting Human-Elephant Conflict (FW1-30 and LR1-5, 2018). Many lambasted the booklet that the government is distributing to help people live with elephants as it implies that the government will not assist with reducing the elephant population (FO1-5 and LR1-5, 2018 and 2020). While the booklet distributed is not per the objectives of the 2003 National Policy on Managing Elephants, it is in accordance with the 2013 Department of Wildlife and National Policy on Wildlife objective of community awareness and training on wildlife matters.

Farm owners also lamented the chilli that government had stated that they would distribute to farm owners in the Central District area to repel elephants from their fences (FO1-5, 2018 and 2020). One farm owner stated that “They say they will provide us with chilli but the amount of chilli they are giving is not enough to even cover one side of my farm. I am now running around town to find chilli to cover all sides of my fence. (FO5, 2020)” Another farm owner stated that the chilli appeared to work at first but thereafter, elephants would habituate to the chilli and would continue destroying the farm fence (FO5, 2020).

4.4 Conclusion

The above results are the culmination of the research undertaken on the nature of Human-Elephant Conflict in Mmashoro Village, the impact of Human-Elephant Conflict on Livelihoods, and how government interventions are restricting or enabling livelihoods. The results show that the nature of Human-Elephant Conflict in Mmashoro Village and surrounding farms has increased over time and mostly entails destruction of fences, JoJo tanks and other small equipment. Human-Elephant Conflict has impacted on community members financial livelihoods, their future financial livelihoods, as well as their emotional and social livelihoods.

In terms of government interventions, while the secondary data indicates that several measures should be implemented by government, only some of these are presently being implemented. Some of the government interventions discussed in the policy documents are also not applicable to Mmashoro Village which is not located near a protected area and thus experiences conflict on a more haphazard, stochastic basis. These results are discussed in the next chapter.

5 DISCUSSION

Human-Elephant Conflict, particularly in rural areas, is a topic of historic and contemporary concern transcending through the 21st century and threatening the livelihoods of the local communities exposed to the phenomenon (Martin 2019, Salerno et al 2018, Neupane 2017, Pozo et al 2017, Jadhav and Barua 2015, De Motts and Hoon 2012, Hoare 2003). Human-Elephant Conflict often occurs where communities are located adjacent to or near protected areas (Pozo et al 2017 and Mayberry 2017). Minimal research has been undertaken on the nature of Human-Elephant Conflict where it occurs far from protected areas and the impacts thereof on the livelihoods of those affected by the conflict (Martin 2019).

Government interventions for managing conflict require strong regulatory frameworks often enforced by government strategies and policy frameworks (Neupane 2017). In Botswana, the dominant intervention implemented by the government is compensation for those affected by Human-Elephant Conflict (Pozo et al 2017, Jackson et al 2008, Masunga et al 2007, Mosojoane 2004). However, this has not stemmed the growing impact of Human-Elephant Conflict (Nkala 2015). This chapter discusses the results of this study wherein the nature of Human-Elephant Conflict in the Central District of Botswana, how Human-Elephant Conflict impacts on livelihoods of the communities affected by the phenomenon, and how government interventions restrict or enable livelihoods of these communities were investigated.

5.1 The Nature of Human-Elephant Conflict in the Central District

Human-Elephant Conflict is a phenomenon that commonly occurs at the interface of human settlements and elephant ranges (Pozo et al 2017). The phenomenon occurs where humans and elephants share space in time and often occur adjacent to protected areas (Salerno et al 2018, Jackson et al 2008). Human-Elephant Conflict is increasing in extent and severity due to the increase in agricultural land-use expansion into previously natural areas (Pozo et al 2017, Nkala 2015). Human-Elephant Conflict occurs in several ways including crop-raiding which is the most common form of conflict, damage to infrastructure, and injury and death of both species of elephant and humans (Mayberry et al 2017 and Songhurst et al 2012). Human-Elephant Conflict usually occurs where human settlements are located near to a protected area thereby bringing the community into contact with elephants continuously (Pozo et al 2017, Mayberry et al 2017, Jadhav and Barua 2015). Little is known of Human-Elephant Conflict in areas where

communities are not located near or adjacent to protected areas as is the case with Mmashoro Village in the Central District of Botswana. Understanding the nature of Human-Elephant Conflict is important to managing Human-Elephant Conflict in the different areas where conflict occurs.

Crop raiding is the most common form of Human-Elephant Conflict and often results in elephants raiding crops and farmers losing a substantial amount of their subsistence crops (Evans and Adams 2018). Crop raiding is detrimental to the local rural economy and has direct impacts on the livelihoods of the local communities. In Africa, crop raiding is a common form of Human-Elephant Conflict and has been noted in areas such as Kenya (Evans and Adams 2018), in Ghana (Dakwa et al 2014), and Northern Botswana (Salerno et al 2018 and Pozo et al 2017). Crop raiding in these areas has, often, resulted in a partial or complete abandonment of subsistence farming as a result of persistent crop losses (Salerno et al 2018) which results in an increased dependency on government subsidies and aid. As such, the impact of crop-raiding on local, rural communities is a cumulative economic disenfranchising of local communities.

Human-Elephant Conflict in the Central District of Botswana takes on a different, form, however from the nature of Human-Elephant Conflict described above. Human-Elephant Conflict in Mmashoro Village and surrounding farms does not occur in the form of crop-raiding but rather in the form of damage to infrastructure, farm fences, and water tanks. This is mainly because the farming activities in the area are in the form of livestock rearing with less focus on crop farming (LR1, LR4, 2018). Elephants that traverse through the area damage farm fences and pierce through JoJo tanks in search of water (LR1-3 and FO1-5, 2018 and 2020). This is further supported by the view of farm owners (FO1-3 and FO5, 2018 and 2020) and residents (LR3-5, 2018) in the area that elephants do not reside in the area or nearby as is the case with those in Kenya and Northern Botswana but simply pass through the area. Furthermore, since Mmashoro Village is not located near any protected area or wildlife management area, it follows that there are no elephants permanently residing in the area. Mmashoro Village is an example of an area where Human-Elephant Conflict does not occur near a protected area.

A similar report described and corroborated the findings of this study and was based in Xishuangbanna, China (Jia and Wei, 2020). The report indicated that elephants were moving out of protected areas into far away human settlements resulting in unexpected instances of Human-Elephant Conflict. The report further indicated that the movement of elephants outside

of nature reserves was motivated by the increased number of elephants and consequent increased need for space and nutrition. In the Chinese context, elephants were becoming increasingly stubborn - a similar finding to this study into Human-Elephant Conflict in the Central District of Botswana (Jia and Wei, 2020). Another report centred around Human-Elephant Conflict in Kenya corroborated the findings of this study. The report states, “*Rising incidents of human- elephant conflict are occurring where elephants are exploring old migratory routes and either being blocked by new developments or breaking into farmland plots...*” The report thus motivates that the movement of elephants outside of protected areas is motivated by the elephants seeking out old migratory routes and conflict is caused when the elephants encounter new developments and farmland plots – a similar trend observed in the Central District of Botswana.

While the above reports indicate that there are some instances where elephants are moving out of protected areas and conflict occurring far from protected areas, this study asserts that there is a gap in the literature relating to this subject. Research into Human-Elephant Conflict which occurs far from protected areas is relatively scarce with most research centering around Human-Elephant Conflict which occurs where human settlements are adjacent to protected areas. In Kenya on the other hand, migratory and resident elephants were located in the adjacent Masai Mara National Reserve and were permanently moving into human settlements. While the conflict was not occurring far from protected areas, it was occurring with migratory elephants who traversed larger distances of the landscape. Thus while this study did not corroborate the findings of the thesis, it helped to indicate that most studies were associated with conflict occurring adjacent to protected areas (Nyumba et al, 2020). While this may well be that most Human-Elephant Conflict occurs under these conditions, there is an increasing trend of Human-Elephant Conflict occurring far from protected areas (Elephants and Bees, Nkala 2015) – a nuanced phenomenon that requires further research.

In areas where Human-Elephant Conflict occurs in proximity to protected areas, conflict occurs on a continuous basis (Pozo et al 2017) as noted in Northern Botswana (Salerno et al 2018). Human-Elephant Conflict in Mmashoro Village and surrounding farms has been increasing over time as noted from the results but occurs in a haphazard, punctuated manner. FO5, 2018 further believes that this increase has been accompanied by a change in behaviour in the elephants frequenting the area from initially meek animals to more stubborn animals that refuse to be chased away. As such, the nature and rate of Human-Elephant Conflict in Mmashoro

Village and surrounding farms has not been consistent but has rather been increasing over time albeit haphazardly. This is further confirmed by data from the Department of Wildlife and National Parks which showed a general increase in Human-Elephant Conflict in the Central District (Department of Wildlife and National Parks, 2018).

5.2 Impacts of Human-Elephant Conflict on the Livelihoods of Community Members

Human-Elephant Conflict impacts the livelihoods of local communities (Salerno et al 2018 and Jadhav and Barua 2015). Several studies have indicated that the financial burden of the loss of crops through crop-raiding, injury of community members, death of community members, and damage to structures is borne by local communities (Mayberry 2017, Jadhav and Barua 2015, De Motts and Hoon 2012). Human-Elephant Conflict has a direct impact on the financial livelihoods of local communities. However, the impact of Human-Elephant Conflict on the livelihoods of local communities is not well understood in areas where communities are not located near protected areas (Martin 2019). The results of this study showed that Human-Elephant Conflict impacts on the livelihoods of local communities even when human settlements are not located near protected areas. While the impact is not through loss of crops in Mmashoro Village and surrounding farms, the study area, the impact on financial livelihoods is through damage to and loss of infrastructure, fencing, gardens, and water tanks. It is evident (FO1-5, LR1-5, FW1-30, 2018 and 2020), therefore, that even where elephants do not reside in an area or an adjacent protected area, the impact of Human-Elephant Conflict on the financial livelihoods of local communities remains pronounced.

The impact of Human-Elephant Conflict on the financial livelihood of local communities is, however, varied. For instance, in communities where crop-raiding occurs, the impact is the loss of crops in the season and the immediate loss of financial capital and profit that could have resulted from a successful harvest (Salerno et al 2018, Pozo et al 2017, Neupane et al 2017). In the Central District, where crop-raiding does not occur, the immediate impact on farm owners is that of loss of financial resources through the need to constantly repair damaged infrastructure and travel to one's farms to inspect damages and report them to the local district offices for compensation (FO1-5, 2018 and 2020). Compared to the northern reaches of the country, this impact is not continuous but is haphazard and punctuated due to the haphazard nature with which elephants frequent the area.

Human-Elephant Conflict also impacts on the future financial livelihood of farm owners. When elephants destroy fences, cows can move out of their specific paddocks and breed with other breeds outside of the paddock (FO3, 2020). Farmers who are intent on selling beef from a specific breed to the European Union, therefore, are unable to guarantee the breed of the offspring of their cows. In so doing, Human-Elephant Conflict through damaged fences impacts on the future earnings and potential financial livelihood of farm owners. Botswana exports approximately 9000 tonnes of beef to the European Union annually however only 20% of the meat received from farmers before export meet the European Union requirements (Pinielo 2018).

The impact of Human-Elephant Conflict on different members of the community in Mmashoro Village and surrounding farms is not uniform. The impact of Human-Elephant Conflict on farmworkers in the Central District is in the form of restricted movement caused by the fear of possibly encountering an elephant (LR1-6, 9-15, 26-28, 2018 and 2020). This impact is not physical and tangible but has a direct impact on the emotional and mental well-being of the local community especially those whose work (i.e. cattle rearing and herding) is dependent on movement (Jadhav and Barua 2015). This aspect of Human-Elephant Conflict in Central District is similar to what is observed in other areas including Northern Botswana (Mayberry et al 2017) and India (Jadhav and Barua 2015). In this way, it appears that the nature of Human-Elephant Conflict far exceeds the visible, physical impacts but also has longer-lasting, unseen, emotional, and mental impacts on the recipient communities including the Central District of Botswana community (Mayberry et al 2017 and Jadhav and Barua 2015).

The above impact further translates into an inability to seek work opportunities and carry out work duties in the case of farmworkers (FW19-22, 2018 and 2020). For some farmworkers, this has resulted in a reduction in their wages and for others, loss of work (FW19-22, 2018 and 2020). This is because when farmworkers do not herd cattle due to fear of moving and the cattle are lost, the farm owners recover their losses through their wages or by relieving them from their work (FW2-6 and FW9-14, 2018). This places them in a vulnerable position and further constrains their ability to seek out a livelihood.

5.3 Government Management of Human-Elephant Conflict in the Central District

5.3.1 Government Interventions Globally

Government responses to Human-Elephant Conflict are often described as being reactionary and symptomatic (Songhurst 2012, Jackson et al 2008). To curb Human-Elephant Conflict, the short term and long-term temporal and spatial dynamics must be considered to ensure that the root cause of Human-Elephant Conflict in a particular area is identified and managed (Songhurst 2012, Hoare and Dublin 2010). Because of the dynamics of Human-Elephant Conflict, Hoare and Dublin (2010) explain that mitigation and management measures need to be as much an art as a science.

Several methods are employed by governments globally to manage Human-Elephant Conflict. Some of these methods include compensation to individuals affected by conflict as well as the promotion of wildlife deterrent measures to protect the livelihoods of communities (Acharya et al 2016). One such wildlife deterrent method entails the shooting of problem elephants that are suspected of carrying out crop-raiding activities. Acharya et al (2016) argue that this is a symptomatic approach that does not address the drivers and causes of Human-Elephant Conflict. Furthermore, it is argued that this method is flawed as identifying the culprit elephant is often difficult (Acharya et al 2016 and Jackson et al 2008) which may lead to the killing of “innocent” elephant individuals.

The above methods are usually implemented in areas where communities are located adjacent to protected areas. The measures above are easier and more effective in these areas as the presence of elephants in the area is permanent and at times predictable (Martin 2019 and Neupane et al 2017). Identifying problem elephants in areas adjacent to protected areas is feasible as the elephants reside in the same geographic area as the affected communities making it easier to trace problem elephants (Pozo et al 2017). Compensation, while widely ineffective, is also more feasible for areas adjacent to protected areas as it is easier to trace and quantify the extent of damage caused by elephants (Mayberry et al 2017). The damage is often widespread and experienced by several members of the community per incident. Mmashoro Village is different as the village and surrounding farms are not located adjacent to protected areas. As such, the methods above are not applicable for an area like Mmashoro Village and surrounding farms where the presence of elephants is not a permanent and predictable occurrence (Martin 2019).

5.3.2 Government Interventions in Mmashoro Village and Surrounding Farms

The killing of problem elephants is not a practice currently undertaken in the Central District of Botswana although it is identified as potential mitigation to Human-Elephant Conflict in the Government of Botswana policy documents. This may be because the primary agricultural practice in Mmashoro village is livestock rearing and not subsistence farming. As a result, the Human-Elephant Conflict in Mmashoro does not take the form of crop-raiding- an activity for which problem elephants are killed (Salerno et al 2018 and Neupane 2017). Furthermore, problem elephants usually reside in protected areas adjacent to communities and often utilise the protected area as a refuge after raiding activities (Pozo et al 2017 and Masunga et al 2007). Since Mmashoro Village is not located near a protected area, there is no nearby areas for elephants to take refuge in after raiding areas. Identifying problem elephants would thus be a difficult task.

Other government responses to Human-Elephant Conflict worldwide include translocation of elephant herds, culling of elephant herds, erecting of fences, and the use of buffer crops (crops that are not considered pleasant by elephants) (Acharya 2016). These methods have been employed in Kenya and Cameroon (Acharya 2016). In the Central District of Botswana, however, the only method from the aforementioned that has been implemented is the erecting of fences. It must be noted, however, that the erecting of fences was not initially undertaken to deter elephants but rather to demarcate the cadastral boundary of one's property. The erection of fences is not a government response in most cases as fences are erected by property owners (FO1-5 and LR1-3, 2018 and 2020).

The Department of Wildlife and National Parks identifies the following as the measures to be taken to address Human-Wildlife Conflict (Department of Wildlife and National Parks Wildlife Policy 2013):

- Developing and implementing a human-wildlife conflict strategy
- Provide incentives to ensure wildlife tolerance. This could be in the form of sustainable utilisation of resources and ensuring that benefits received from this endeavor are given to the local communities
- Strengthen the Problem Animal Control unit to promptly respond to animal-related issues

- Community awareness and training on wildlife conservation and empower community members to undertake problem animal control on their own
- Encourage the establishment of problem animal ‘sanctuaries’ through the assistance of the private sector

The only measure for encouraging tolerance of coexistence with elephants is compensation and information books encouraging co-existence with elephants (FO 1-5 and LR1-5, 2018 and 2020). Interviewees stated that they were not being empowered by the government to address or manage conflict save for the chilli that the government was providing to ward off elephants from farms (FO3-5, 2018 and 2020). Notwithstanding the above, the provision of chilli by government was not enough to cover the entire length of one’s fence (FO5, 2020) – a common problem experienced with compensation as well. This approach was also flawed as it did not address the Human-Elephant Conflict experienced by farmworkers and some residents who are not property owners as one cannot place chilli on a fence that does not belong to them.

It was stated that in Mmashoro Village, no effort was being made to establish problem animal sanctuaries as stated in the policy documents. The strategy would not be feasible in any case since it would be difficult to identify problem elephants as elephants do not reside in the area neither is the area located in proximity to protected areas. While community awareness as stated in the policy documents is sometimes undertaken through informing the public of elephants in the area through Facebook Posts and handbooks, it must be noted that not all community members have access to Facebook and thus do not form part of the awareness campaigns being undertaken by the government (FW2-8, 14-16, 18-20, 25-28, 2018 and 2020). Some community members particularly some farm workers are also not literate and thus cannot read the information in the booklets provided (FW1-8, 2018).

Thus, while it was found that some interventions are being implemented by the government, these are not in line with or are not adequate enough as per the interventions described in the policy documentation. Furthermore, interventions by the government do not address the impact of Human-Elephant Conflict on all stakeholders, particularly those who do not own land or have access to internet services to access Facebook or ability to read the handbooks provided. Even where government interventions are reaching some stakeholders, the efforts are not

comprehensive enough to address the impacts of Human-Elephant Conflict on the livelihoods of stakeholders affected by Human-Elephant Conflict.

5.3.3 Compensation as A Government-Led Management Tool

As stated above, a management strategy employed worldwide is compensation to parties affected by Human-Elephant Conflict (Acharya 2016). The strategy was implemented in Kenya and Zimbabwe (Hoare 2004). In Zimbabwe, it was found that compensation was open to abuse as claims for compensation quadrupled in the second year of operation (Acharya 2016, De Motts and Hoon 2012, Hoare 2001).

The Government of Botswana, employs, as a means of managing Human-Elephant Conflict compensation for those affected by Human-Elephant Conflict (Salerno et al 2018, Department of Wildlife and National Parks 2012, Jackson et al 2008, Mosojoane 2004). The compensation is calculated based on a fixed price for every square metre that has been destroyed by elephants (Jackson et al 2008). \$1.13 million was paid out during the first five years of operation of compensation (Hoare 2001). During interviews with farm owners of the farms adjacent to Mmashoro village, they stated that compensation granted was often too little with the process of obtaining compensation too laborious (Karanth 2018, Jackson et al 2008) (FO1-5, 2018 and 2020). Oftentimes, this led to residents not reporting damages caused by elephants to local environmental authorities (Salerno et al 2018). The cost of farm owners travelling from Gaborone to their farms to inspect the fences and then proceed to report the damage is far greater than the compensation they receive from government. In this way, this government intervention does not enable livelihoods of farm owners.

Furthermore, compensation is usually only be paid for physical, tangible damages inflicted on property by elephants while obtaining compensation for the unseen impacts and impacts on emotional livelihoods is often difficult (Acharya 2016). This reduces the impact of Human-Elephant Conflict to physical property and damage. However, as evidenced in the results of interviews conducted with local residents and farmworkers, Human-Elephant Conflict manifests in different forms including death, injury, restriction of movement of both humans and elephants, fear for the safety of one's family (LR1-5, 2018 and LR1-30, 2018 and 2020). Local residents and farmworkers expressed their inability to move about freely which, in some

cases, negatively impacted their work as farm workers. These forms of conflict cannot be financially compensated as they are impossible to quantify (Jadhav and Barua 2012).

The use of compensation as a management tool is described as a symptomatic approach to rectifying and reducing incidents of Human-Elephant Conflict (Acharya 2016, Jackson et al 2008). The causes of Human-Elephant Conflict are not addressed in this management tool (Acharya 2016). The lack of an adequate management strategy for the management of Human-Elephant Conflict is impacting on livelihoods of local communities exposed to increasing elephant movement in their environments and locales such as is the case in Mmashoro Village. Residents are increasingly limited in their movement thereby restricting their ability to work and access resources. As such, the current, main management structure of compensation results in a negative impact on the livelihoods of local residents. Since compensation is only provided for physical, visible, and quantifiable impacts, this management strategy excludes individuals affected by Human-Elephant Conflict where such impacts are invisible and intangible. The financial and emotional livelihoods of residents and farmworkers are, therefore, inadvertently restricted by the compensation strategy. This is, in fact, a common problem with the compensation strategy observed globally (Pozo et al 2017 and De Motts and Hoon 2012)

5.4 How Government Interventions Constrain or Enable Sustainable Livelihoods

The Sustainable Livelihoods Framework was applied to this study to determine how government interventions for the management of Human-Elephant Conflict restrain or enable livelihoods of the local communities affected by conflict with elephants. The Sustainable Livelihoods Framework was used to assess if the local community, farmworkers, and farm owner's livelihoods could cope with and recover from shocks and stresses such as elephant movement through their work and living areas (Nyirenda et al 2018). If the livelihoods could cope with this shock, this would render their livelihoods sustainable and maintain their jobs, farming activity, and assets for future generations (Nyirenda et al 2018).

The livelihoods and sustainability of these livelihoods as a result of Human-Elephant Conflict were found to be at risk. The farmworkers and community members who reside in villages such as Mmashoro Village are exposed to potential conflict with elephants and are unable to access resources and assets for fear of encountering elephants (FW1-5, FW9-9, FW222, LR 1-

5, 2018). As such, the sustainability of their livelihoods is greatly constrained. The Government's limited management strategies further exacerbate this risk and cement the unsustainability of these livelihoods not only for future generations but for the current generation. The laborious process of accessing compensation for damage to farms and infrastructure also exposes farm owners to risk in terms of their livelihoods (FO1-3 and FO5, 2018 and 2020). One farm owner stated, "It is not even worth it for me to come from Gaborone to report damage to my fence because the little money I receive as compensation does not even cover my petrol costs (FO2, 2018)." While farm owners were found to have the most sustainable livelihoods, the lack of adequate government management of Human-Elephant Conflict constrained their ability to seek increased financial livelihoods through, for example, exporting beef to the European Union.

6. CONCLUSION

Human-Elephant Conflict is a topic of conservation and socio-economic concern considering its impacts on elephants and humans alike. The phenomenon has been occurring since the 19th century in Asia and Africa. Land-use changes and human expansion into previous wildlife strongholds have exacerbated and increased Human-Elephant Conflict notwithstanding the impacts of an increase in the human population worldwide and the expansion of human settlements into wild areas. Human-Elephant Conflict in the Central District of Botswana is on an increasing trend albeit being relatively recent i.e. since 2011.

All objectives of this study were reached indicating that the study was successful in obtaining the main expected outcomes. One of the objectives of this study was to understand the nature of Human-Elephant Conflict in the Central District of Botswana. The nature of Human-Elephant Conflict was determined as being damage to infrastructure as opposed to crop raiding observed in other parts of the country and globally as well as the fact that Human-Elephant Conflict in Central District is relatively new. The nature of the conflict was also determined as conflict occurring far from protected areas and known elephant habitats.

This study had also set out to determine how livelihoods of the local community have been affected by Human-Elephant-Conflict in the area, and how members of the community have been responding to the impacts of Human-Elephant Conflict. The impacts of Human-Elephant Conflict were determined to be on the emotional wellbeing of particularly workers and residents and impacts on the financial wellbeing of farmowners. It was determined that an additional risk to financial wellbeing and income was being experienced by farmworkers and farmowners through potential loss of jobs and loss of future income from trading beef, respectively.

Finally, this study set out to assess local perceptions of whether the government's response to Human-Elephant Conflict in the area is enabling or prohibiting livelihoods of the local community by comparing government interventions as documented in documentary evidence versus the lived experience of community members affected by conflict. Determining the government management interventions utilised in Central District and how these interventions are enabling or restraining livelihoods was achieved. Government interventions included

compensation for damages caused by elephants, providing insufficient chilli to farmowners for application on their fences, providing booklets to encourage co-existence with elephants as well as publishing Facebook and other related posts to ward residents of elephants in their areas. Most government interventions were found to be restricting livelihoods mostly due to the slow bureaucratic processes required as well as some ineffective measures such as providing booklets and publishing Facebook posts which many affected community members could not access. While chilli was provided to farm owners, it was not sufficient enough for farmowners to cover the length of their farm fences. These measures restricted livelihoods as more money had to be spent to purchase chilli, farmowners had to leave the city in Gaborone to report damages and wait long periods to receive compensation which in itself was not sufficient to cover loss caused, and farmworkers were restricted from rearing cattle due to fear of encountering elephants and would at times be at risk of losing their jobs.

Concluding remarks about Human-Elephant Conflict in the area

Human-Elephant Conflict in the Central District is relatively recent and is characterised by destruction of infrastructure and restriction of movement. Human-Elephant Conflict in this area impacts on a wide range of stakeholders who vary in their socio-economic profiles. These are: farmowners, farmworkers, and local residents of the adjacent villages. Impacts on stakeholders include damage to infrastructure, loss of income, fear of movement, restriction of work duties, and risk to future income.

Management interventions currently in place are uniform interventions employed in all areas of Botswana where Human-Elephant Conflict occurs. This includes compensation for damages, provision of booklets to educate stakeholders, and media posts about elephant sightings. These management interventions are not applicable to the study area as this study area experiences Human-Elephant Conflict far from protected areas where elephants reside. A nuanced and adaptive approach to managing Human-Elephant Conflict in these types of areas is needed to ensure effective management of conflict. This author recommends the strengthening and increasing of chilli being provided to farmowners for application on their fences. Further studies must also be commissioned into the effectiveness of chilli to ward of elephants. This study further recommends speedy compensation to ensure that damages to infrastructure are investigated soon after they occur in order to build a possible database of conflict hotspots. The use of drone imagery as has been undertaken in Tanzania may be useful

in this regard. Lastly, this study recommends, effective consultation with all stakeholders by the Department of Wildlife and National Parks with regular posters, training of community members to become wildlife rangers and to assist with conflict.

Potential Need for Policy Change in Botswana

Policy around Human-Elephant Conflict is dated and inapplicable to some conflict areas such as the Central District. It is clear that policy for management of Human-Elephant Conflict was developed for areas where human settlements are located adjacent to protected areas. The conflict studied in the Central District has shown that this is not the case everywhere. This points to a need for adaptive policy changes which reflect the areas for which they are written.

It is recommended that guidelines be written for different districts in Botswana which would provide more specific policies for the areas they are written for. Furthermore, it is recommended that policy takes into account climate change and the impact this may have on Human-Elephant Conflict particularly in the semi-arid to arid region of Botswana where competition for water will likely increase.

7. REFERENCES

Acharya, K.P., Paudel, P.K., Neupane, P.R. and Köhl, M., 2016. Human-wildlife conflicts in Nepal: patterns of human fatalities and injuries caused by large mammals. *PLoS one*, 11(9), p.e0161717.

African Elephant Action Plan (2010). Available: <https://www.unenvironment.org/pt-br/node/21802>. [2018, October 10];

Alastair Leithead. (2016). Why Elephants are Seeking Refuge in Botswana. Available: <http://www.bbc.com/news/world-africa-37230700> [2017 October 30];

Barnes, R.F., (1999). *African elephant database 1998* (No. 22). IUCN;

Barnes, R.F.W. (2002). Treating crop raiding elephants with aspirin. *Pachyderm* 33: 96-99;

Barnes, R.F.W., Asika, S., Asamoah-Boateng, B. (1995) Timber, cocoa and crop-raiding elephants: a preliminary study from southern Ghana. *Pachyderm*, 19, 33 38;

Bell, R.H.V. (1984) The man–animal interface: an assessment of crop damage and wildlife control. *Conservation and Wildlife Management in Africa* (eds R.H.V.Bell & E.Mcshane-Caluzi), pp. 387 416. US Peace Corps, Malawi;

Brand Botswana (2020). Conservation is in Our DNA. [Facebook update, June 15]. Available: <https://www.facebook.com/brandbotswana>. [2020, April, 5].

Charmaz, K. and Belgrave, L.L., (2007). Grounded theory. *The Blackwell encyclopedia of sociology*;

Chen, Y., Marino, J., Chen, Y., Tao, Q., Sullivan, C.D., Shi, K. and Macdonald, D.W., (2016). Predicting hotspots of Human-Elephant Conflict to inform mitigation strategies in Xishuangbanna, Southwest China. *PloS one*, 11(9), p.e0162035;

Child, B. and Barnes, G. (2010). The conceptual evolution and practice of community-based natural resource management in southern Africa: past, present and future. *Environmental Conservation*. Cambridge University Press, 37(3), pp. 283–295. doi: 10.1017/S0376892910000512;

Cooper, C. (2013). African Elephants Rediscover Their Routes. <https://africageographic.com/blog/african-elephants-rediscover-their-routes/>;

DeMotts, R. and Hoon, P., (2012). Whose elephants? Conserving, compensating, and competing in Northern Botswana. *Society & Natural Resources*, 25(9), pp.837-851;

Department of Wildlife and National Parks. (2003). National Policy and Strategy for the Conservation and Management of Elephants in Botswana. Gaborone, Botswana;

Department of Wildlife and National Parks. (2013). Wildlife Policy. Gaborone, Botswana;

Department of Wildlife and National Parks, (2003). National Policy and Strategy for the Conservation and Management of Elephants in Botswana. Available: <https://www.iucn.org/sites/dev/files/import/downloads/bwstrategyfinal.pdf> . [2018, October 10];

Desai, A.A. and Riddle, H.S., (2015). Human-elephant conflict in Asia. *US Fish and Wildlife Service Asian Elephant Support*.

Distefano, E., (2005). Human-Wildlife Conflict worldwide: collection of case studies, analysis of management strategies and good practices. *Food and Agricultural Organization of the United Nations (FAO), Sustainable Agriculture and Rural Development Initiative (SARDI), Rome, Italy*. Available from: *FAO Corporate Document repository* <http://www.fao.org/documents>;

Idowu, O.E., 2016. Criticisms, constraints and constructions of case study research strategy. *Asian Journal of Business and Management*, 4(5).

Dublin, H.T. and Hoare, R.E., (2004). Searching for Solutions: The Evolution of an Integrated Approach to Understanding and Mitigating Human–Elephant Conflict in Africa. *Human Dimensions of Wildlife*, 9(4), pp.271-278;

Evans, L.A. and Adams, W.M., (2018). Elephants as actors in the political ecology of human–elephant conflict. *Transactions of the Institute of British Geographers*;

Elephants and Bees. Human-Elephant Conflict in Africa. Available from: <https://elephantsandbees.com/human-elephant-conflict-africa/>.

Fabricius, C. (2015). Community-Based Natural Resource Management. *Management of Agricultural, Forestry, and Fisheries Enterprises*. Volume 1;

Fernando et al. (2003). Perceptions and Patterns of Human–elephant Conflict in Old and New Settlements in Sri Lanka: Insights for Mitigation and Management. *Biodiversity and Conservation*. Vol 14. Issue 10. Pp 2465-2481;

Fernando, P., Kumar, M.A., Williams, A.C., Wikramanayake, E., Aziz, T. and Singh, S.M., (2008). Review of human-elephant conflict mitigation measures practiced in South Asia. Gland, Switzerland: WWF.

Freeman, L., (2004). The development of social network analysis. *A Study in the Sociology of Science*, 1;

Government of the Republic of Botswana. (2020). Elephants Roaming in the Mmashoro Area. [Facebook update, March 12]. Available: <https://www.facebook.com/BotswanaGovernment/posts/2816476161768357> [2020, April, 5].

Gubbi, S., (2012). Patterns and correlates of human–elephant conflict around a south Indian reserve. *Biological Conservation*, 148(1), pp.88-95;

Hahn, N., Mwakatobe, A., Konuche, J., de Souza, N., Keyyu, J., Goss, M., Chang'a, A., Palminteri, S., Dinerstein, E. and Olson, D., 2017. Unmanned aerial vehicles mitigate human–elephant conflict on the borders of Tanzanian Parks: a case study. *Oryx*, 51(3), pp.513-516.

Hedges, S. and Gunaryadi, D. (2010) “Reducing human–elephant conflict: do chillies help deter elephants from entering crop fields?” *Oryx*. Cambridge University Press, 44(1), pp. 139–146. doi: 10.1017/S0030605309990093;

Hoare, R.E., (1999). Determinants of human–elephant conflict in a land-use mosaic. *Journal of applied ecology*, 36(5), pp.689-700;

<http://elephantsandbees.com/human-elephant-conflict-africa/>;

Hughes, D.A., Kingston, D.G. and Todd, M.C., (2011). Uncertainty in water resources availability in the Okavango River basin as a result of climate change. *Hydrology and Earth System Sciences*, 15(3), pp.931-941;

Jackson, T.P., Mosojane, S., Ferreira, S.M. and van Aarde, R.J., (2008). Solutions for elephant *Loxodonta africana* crop raiding in northern Botswana: moving away from symptomatic approaches. *Oryx*, 42(01), pp.83-91;

Jadhav, S. and Barua, M., (2012). The Elephant Vanishes: Impact of human–elephant conflict on people's wellbeing. *Health & place*, 18(6), pp.1356-1365;

Johnson, M.F., Karanth, K.K. and Weinthal, E., (2018). Compensation as a Policy for Mitigating Human-wildlife Conflict Around Four Protected Areas in Rajasthan, India. *Conservation and Society*, 16(3), pp.305-319;

Junker, J., van Aarde, R.J. and Ferreira, S.M., (2008). Temporal trends in elephant *Loxodonta africana* numbers and densities in northern Botswana: is the population really increasing? *Oryx*, 42(1), pp.58-65;

Jia, K and Han Wei, C. (2020). Human-elephant conflict escalates in China's Xishuangbanna. *Nikkei Asia*. Available from: <https://asia.nikkei.com/Spotlight/Caixin/Human-elephant-conflict-escalates-in-China-s-Xishuangbanna>

Kansky, R. and Knight, A.T., (2014). Key factors driving attitudes towards large mammals in conflict with humans. *Biological Conservation*, 179, pp.93-105;

Karanth, K.K., Gupta, S. and Vanamamalai, A., (2018). Compensation payments, procedures and policies towards human-wildlife conflict management: Insights from India. *Biological Conservation*, 227, pp.383-389;

Karthick, S. and Ramakrishnan, B., (2018). Human-Elephant Conflict issues in the fragmented o'valley forest range, gudalur forest division, Tamilnadu. *International Journal of Current Research in Life Sciences*, 7(04), pp.1852-1857;

Laerd (2012). Purposive Sampling. Available from:
<http://dissertation.laerd.com/purposive-sampling.php>

Locke, P., 2013. Explorations in ethnoelephantology: Social, historical, and ecological intersections between Asian elephants and humans. *Environment and Society*, 4(1), pp.79-97.

Locke, P., 2017. Elephants as persons, affective apprenticeship, and fieldwork with nonhuman informants in Nepal. *HAU: Journal of Ethnographic Theory*, 7(1), pp.353-376.

Longhurst, R., (2003). Semi-structured interviews and focus groups. *Key methods in geography*, 3(2), pp.143-156

Mariki, S.B., Svarstad, H. and Benjaminsen, T.A., (2015). Elephants over the cliff: explaining wildlife killings in Tanzania. *Land Use Policy*, 44, pp.19-30.

Martin, B., (2019). Living Together: Resolutions to Human-Elephant Conflict and Other Problems. In *Survival or Extinction?* (pp. 517-523). *Springer, Cham.*

Massé, F. (2016) The political ecology of human-wildlife conflict: Producing wilderness, insecurity, and displacement in the Limpopo National Park. *Conservation and Society*, 14 (2). pp. 100-111. ISSN 0972-4923;

Masunga, G., (2007). Extent and nature of Human-Elephant Conflict in northern Botswana. *Department of Wildlife and National Parks*, Maun, Botswana;

Mayberry, A.L., Hovorka, A.J. and Evans, K.E., (2017). Well-Being Impacts of Human-Elephant Conflict in Khumaga, Botswana: Exploring Visible and Hidden Dimensions. *Conservation and Society*, Volume 15(3), pp.280-291;

McGuirk, Pauline M. and O'Neill, Phillip, "Using questionnaires in qualitative human geography" (2016). Faculty of Social Sciences - Papers. 2518.
<https://ro.uow.edu.au/sspapers/2518>

Mosojane, S. (2004). Human-Elephant Conflict along the Okavango Panhandle in northern Botswana. *MSc Thesis (University of Pretoria)*;

Mumby, H.S. and Plotnik, J.M., 2018. Taking the elephants' perspective: remembering elephant behavior, cognition and ecology in human-elephant conflict mitigation. *Frontiers in Ecology and Evolution*, 6, p.122.

Münster, D. and Münster, U., (2012). Human-animal conflicts in Kerala: Elephants and ecological modernity on the agrarian frontier in South India. *RCC Perspectives*, 5, pp.41-49;

Naughton, L., Rose, R. and Treves, A., (1999). The social dimensions of Human-Elephant Conflict in Africa: A literature review and case studies from Uganda and Cameroon. A Report to the African Elephant Specialist Group, Human-Elephant Conflict Task Force, IUCN, Glands, Switzerland;

Neupane, D., Johnson, R.L. and Risch, T.S., (2017). How do land-use practices affect human—elephant conflict in Nepal?. *Wildlife Biology*, pp.wlb-00313;
Ntummy, EKB (2014)

The State and Land Legislation in Botswana, Working Paper 30. PLAAS, UWC: Bellville;

Nyati-Ramahobo, L., 2008. Minority tribes in Botswana: The politics of recognition. London: Minority Rights Group International;

Nkala, O. 2017. Why Are Elephants in Northern Botswana Migrating South Into Previously Unoccupied Habitat? Available:
<https://voices.nationalgeographic.org/2017/05/02/why-are-elephants-in-northern-botswana-migrating-south-into-previously-unoccupied-habitat/> [2017 October 30];

Nyirenda, V.R., Nkhata, B.A., Tembo, O. and Siamundele, S., (2018). Elephant crop damage: Subsistence farmers' social vulnerability, livelihood sustainability and elephant conservation. Sustainability, 10(10), p.3572.

Nyumba, T.O., Emenye, O.E. and Leader-Williams, N., (2020). Assessing impacts of human-elephant conflict on human wellbeing: An empirical analysis of communities living with elephants around Maasai Mara National Reserve in Kenya. PloS one, 15(9), p.e0239545.

Parker, G.E, Osborn, F.V., Hoare, R.E & Niskanen, L.S (2007). Human-Elephant Conflict Mitigation : A Training Course for Community-Based Approaches in Africa. AfESG;

Perera, B.M.A.O., (2009). The human-elephant conflict: A review of current status and mitigation methods. Gajah, 30, pp.41-52.

Pinielo, I. (2018). Diversification, key to sustainable growth. Mmegi Newspaper. Available from: <https://www.mmegi.bw/index.php?aid=60492&dir=2016/june/03>. [Accessed: 10 May 2020].

Pozo, R.A., Coulson, T., McCulloch, G., Stronza, A.L. and Songhurst, A.C., (2017). Determining baselines for Human-Elephant Conflict: A matter of time. PloS one, 12(6), p.e0178840;

Purdon, A., Mole, M.A., Chase, M.J. and van Aarde, R.J., (2018). Partial migration in savanna elephant populations distributed across Southern Africa. Scientific reports, 8(1), p.11331;

Research and Statistics Division Department of Wildlife & National Parks Botswana. (2012). Aerial census of animals in Botswana, Dry Season 2012;

- Rosenthal, M., (2016). Qualitative research methods: Why, when, and how to conduct interviews and focus groups in pharmacy research. *Currents in pharmacy teaching and learning*, 8(4), pp.509-516.
- Røskaft, E., Larsen, T., Mojaphoko, R., Raihan Sarker, A.H.M. and Jackson, C., (2014). Human dimensions of elephant ecology. *Elephants and Savanna Woodland Ecosystems: A study from Chobe National Park, Botswana*, pp.269-288;
- Salerno, J., Cassidy, L., Drake, M. and Hartter, J., (2018). Living in an Elephant Landscape. *American Scientist*, 106(1), pp.34-41;
- Sampson, C., McEvoy, J., Oo, Z.M., Chit, A.M., Chan, A.N., Tonkyn, D., Soe, P., Songer, M., Williams, A.C., Reisinger, K. and Wittemyer, G., (2018). New elephant crisis in Asia—Early warning signs from Myanmar. *PloS one*, 13(3), p.e0194113;
- Schmidt, C., (2004). The analysis of semi-structured interviews. *A companion to qualitative research*, pp.253-258.
- Schnegg, M and Kiaka, R.D. (2018). Subsidised Elephants: Community-Based Resource Governance and Environmental (in)justice in Namibia. *Geoforum*. Vol 93. Pp 105-115;
- Scoones, I., 1998. Sustainable rural livelihoods: a framework for analysis.
- Sitati, N.W. and Walpole, M.J., (2006). Assessing Farm-Based Measures for Mitigating Human-Elephant Conflict in Transmara District, Kenya. *Oryx*, 40(3), pp.279-286;
- Sitati, N.W., Walpole, M.J., Smith, R.J. and Leader-Williams, N., (2003). Predicting spatial aspects of human–elephant conflict. *Journal of Applied Ecology*, 40(4), pp.667-677;
- Sobrevila, C.(2016). 5 Things You May Not Know About Human - Wildlife Conflict in Botswana. Available: <http://www.worldbank.org/en/news/feature/2016/03/03/5-things-you-may-not-have-known-about-human-wildlife-conflict-in-botswana>. [2017 November 2];
- Songhurst, A.C., (2012). Competition between people and elephants in the Okavango Delta Panhandle, Botswana. PhD Thesis;
- Steyn P. 2014. Counting Elephants From the Air in Africa’s Newest World Heritage Site. *National Geographic*;
- Stevens, J., (2018). Understanding human-elephant interactions in and around Makgadikgadi Pans National Park, Botswana (Doctoral dissertation, University of Bristol).
- Strauss, A. and Corbin, J., (1994). Grounded theory methodology. *Handbook of qualitative research*, 17, pp.273-85;

Suich, Helen. (2010). The livelihood impacts of the Namibian community based natural resource management programme: a meta-synthesis, *Environmental Conservation*. Cambridge University Press, 37(1), pp. 45–53. doi: 10.1017/S0376892910000202; Taylor, R.D., 1999. A Review of Problem Elephant Policies and Management Options in Southern Africa. *IUCN African Elephant Specialist Group Report*;

Tchamba, M.N., (1996). History and Present Status of the Human/Elephant Conflict in the Waza-Logone Region, Cameroon, West Africa. *Biological Conservation*, 75(1), pp.35-41;

Verreynne, E. (2019). Wildlife vet: the Botswana elephant debate is actually about a bigger conservation issue. *Africa Geographic*. Available: https://sherloc.unodc.org/cld/document/bwa/1992/wildlife_conservation_and_national_parks_act_1992.html? [2020, April 11];

Warner, M.Z., (2008). Examining Human-Elephant Conflict in southern Africa causes and options for coexistence. *University of Pennsylvania Repository*;

Wildlife Conservation and National Parks Act, 1992. (1992). Available: https://sherloc.unodc.org/cld/document/bwa/1992/wildlife_conservation_and_national_parks_act_1992.html? [2018, October 10];
Wildlife Policy. (2013). Available: https://library.wur.nl/ojs/index.php/Botswana_documents/article/view/16035/15508 . [2018, October 10];

Wilson, S., Davies, T.E., Hazarika, N. and Zimmermann, A., (2015). Understanding spatial and temporal patterns of human–elephant conflict in Assam, India. *Oryx*, 49(1), pp.140-149;

Zhang, L. and Wang, N., (2003). An initial study on habitat conservation of Asian elephant (*Elephas maximus*), with a focus on Human-Elephant Conflict in Simao, China. *Biological Conservation*, 112(3), pp.453-459;

Zhang, L. and Wang, N., (2003). An initial study on habitat conservation of Asian elephant (*Elephas maximus*), with a focus on human elephant conflict in Simao, China. *Biological conservation*, 112(3), pp.453-459