Conservation Conversations;

Understanding the potential impacts of future policy interventions in Uganda.

Lucy Archer
September 2015

A thesis submitted for the partial fulfilment of the requirements for the degree of Master of Science at Imperial College London

Submitted for the MSc in Conservation Science
Declaration of Own Work

I declare this thesis “Conservation Conversations; Understanding the potential impacts of future policy interventions in Uganda”, is entirely my own work, and that where material could be construed as the work of others, it is fully cited and reference, and/or with appropriate acknowledgement given.

Signature………………………………………………………………………

Name of Student: Lucy Archer

Name of Supervisors: Professor E.J. Milner-Gulland
                    Dr. Henry Travers
# Table of Contents

**List of Tables** ........................................................................................................... vi

**Abbreviations and Acronyms** ................................................................................ vii

**Abstract** ................................................................................................................... viii

**Acknowledgements** ................................................................................................. ix

1. **Introduction** ........................................................................................................... 1

   1.1. Problem Statement ......................................................................................... 1

   1.2. Project Aims and Objectives ......................................................................... 4

   1.3. Structure of Thesis ......................................................................................... 5

2. **Background** ........................................................................................................... 6

   2.1. People and Protected Areas .......................................................................... 6

   2.2. The Cost of Protected Areas in Uganda ....................................................... 6

       2.2.1. Human Wildlife Conflict .................................................................... 6

       2.2.2. Resource Restrictions and Illegal Incursions ....................................... 7

       2.2.3. Cultural Conflicts ............................................................................... 8

   2.3. Protected Area Policies and Wildlife Crime Interventions ......................... 8

       2.3.1. Law Enforcement .................................................................................. 9

       2.3.2. Key Informant Networks and Collaborative Law Enforcement .......... 9

       2.3.3. Integrated Conservation and Development Projects (ICDPs) in Uganda ... 10

           2.3.3.1. Regulated Resource Access .............................................................. 10

           2.3.3.2. Revenue Sharing ......................................................................... 11

   2.4. Livelihoods Investments; a Wildlife Friendly Approach? ............................ 12

   2.5. Ensuring Equity .............................................................................................. 13

   2.6. Scenario Planning and the Effectiveness of Future Policy ......................... 13

   2.7. Study Locations and Management .................................................................... 15

       2.7.1. Murchison Falls Conservation Area ....................................................... 16

       2.7.2. Queen Elizabeth Conservation Area ..................................................... 17

3. **Methodology** ......................................................................................................... 19

   3.1. Methodological Approach ............................................................................. 19

   3.2. Sampling .......................................................................................................... 19

   3.3. Scenario Interview .......................................................................................... 21

   3.4. Pilot Study ........................................................................................................ 22

   3.5 Scenarios ............................................................................................................ 22

       3.5.1. Revenue Sharing Funds Directed to Human-Wildlife Conflict (HWC) Mitigation . 23

       3.5.2. Increased Utilisation of Natural Resources (Sustainable Hunting) ............ 23

       3.5.3. Withdraw of All Access to Resources ..................................................... 24
3.5.4. Wildlife Friendly Enterprise Scheme (WFES) ................................................................. 25
3.5.5. Eco – guards and Anonymous Text Scheme ................................................................. 26
3.6. Statistical Analysis ........................................................................................................... 27

4. Results ............................................................................................................................................. 29

4.1. Business As Usual (BAU) ....................................................................................................... 29
  4.1.1. Impacts of the Conservation Areas on Park Adjacent Households under the BAU Scenario ................................................................. 29
  4.1.2. Fairness Perception under the BAU Scenario .................................................................. 30
  4.1.3. Participation in Informer Networks Under the BAU Scenario ........................................ 30

4.2. Predicted Behavioural Responses to Future Conservation Scenarios .................................. 31
  4.2.1. Labour Allocation Change ......................................................................................... 31
  4.2.2. Likelihood of Participation in Informer Networks ....................................................... 34

4.3. The Equity of Future Policy Options .................................................................................... 36
  4.3.1. Park Fairness .................................................................................................................. 36
  4.3.2. Tackling Perceived Injustice through Increased Resource Access .............................. 38
  4.3.3. Park Impact ................................................................................................................... 40

4.3.2. Tackling Perceived Injustice through Increased Resource Access .............................. 38
  4.2.6. Tackling Perceived Injustice; Reshaping the Revenue Sharing Programme................. 39

4.3.3. Park Impact ................................................................................................................... 40

5. Discussion ....................................................................................................................................... 42
  5.1 Understanding and Predicting Attitudinal and Behavioural Responses to Conservation Interventions ............................................................................................................. 42
  5.2 Policy Effectiveness ............................................................................................................... 42
  5.3 Lessons Learnt ...................................................................................................................... 45
    5.3.1 The Perceived Injustice of Human Wildlife Conflict ...................................................... 45
    5.3.2 Agricultural Improvements; Can Incentivising Income Generation Promote Pro-Conservation Behaviours? ................................................................. 47
    5.3.3 Could a Managed Wildlife Harvest Scheme Work at MFCA or QECA? .................... 49
  5.4 Conservation and Management Lessons .............................................................................. 50
  5.5 Future Management Priorities ............................................................................................ 50

References ......................................................................................................................................... 52

Appendix I Summary of the Drivers of Wildlife Crime in Uganda ............................................. 60
Appendix II Cumulative Link Mixed Models: Mean Estimated Probabilities ......................... 61
Appendix III - Interview Protocol and Scenario Based Interview ............................................. 63

Interview Protocol ............................................................................................................................. 63
Scenario - Based Interview .................................................................................................................. 64
List of Figures

Figure 2.1. Map showing study locations within Uganda ................................................. 16

Figure 2.2. Murchison Falls National Park; Home to the only viable population of Rothschild’s giraffes ................................................................................................................................. 17

Figure 2.3. Wildlife and People living side by side at Queen Elizabeth Conservation Area.. 18

Figure 3.1. Map showing study site of MFCA and study villages .................................. 19

Figure 3.2. Map showing study site of QECA and study villages .................................... 20

Figure 4.1. Predicted changes in labour allocation under the BAU scenario; comparisons between conservation areas .......................................................... 29

Figure 4.2. Predicted changes in participation in informant networks under the BAU scenario; comparisons between conservation areas .................................................. 31

Figure 4.3. Probability of labour allocation changes under future scenarios; mean probabilities dependent upon site and occupation ........................................... 33

Figure 4.4. Probability of informing on wildlife crime changes under future scenarios; comparisons between conservation areas .............................................. 35

Figure 4.5. Probability of fairness ratings under future scenarios; comparisons between ARUs and NARUs .................................................................................. 38

Figure 4.6. Perceived impacts of the park under future scenarios ................................ 41
List of Tables

Table 3.1. Variables included in cumulative link mixed models (CLMMs) ................................. 28

Table 4.1. Coefficient table for CLMM one; fitted with the Laplace approximation; negative values indicate the likelihood of a decrease or no change, positive values indicate the likelihood of a no change or increase compared to baseline conditions. ................................. 32

Table 4.2. Coefficient table for CLMM two, fitted with the Laplace approximation; negative values indicate the likelihood of a decrease or no change, positive values indicate the likelihood of no change or increase compared to baseline conditions. ................................. 34

Table 4.3. Coefficient table for CLMM three, fitted with the Laplace approximation; parameter estimates above -0.02 indicate positive fairness ratings, estimates below -0.20 indicate low fairness ratings compared to baseline conditions. ................................................................. 37

Table 5.1. Policy Performance across Multiple Parameters .......................................................... 42
### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARU</td>
<td>Authorised Resource User</td>
</tr>
<tr>
<td>BNS</td>
<td>Basic Necessities Survey</td>
</tr>
<tr>
<td>CA</td>
<td>Conservation Area</td>
</tr>
<tr>
<td>CARE - DTC</td>
<td>CARE Development Through Conservation</td>
</tr>
<tr>
<td>CITES</td>
<td>Convention on the International Trade of Endangered Species</td>
</tr>
<tr>
<td>CoP</td>
<td>Conference of the Parties</td>
</tr>
<tr>
<td>FR</td>
<td>Forest Reserve</td>
</tr>
<tr>
<td>HWC</td>
<td>Human Wildlife Conflict</td>
</tr>
<tr>
<td>ICDP</td>
<td>Integrated Conservation and Development Project</td>
</tr>
<tr>
<td>IIED</td>
<td>International Institute for Environment and Development</td>
</tr>
<tr>
<td>MFPED</td>
<td>Ministry of Finance Planning and Economic Development</td>
</tr>
<tr>
<td>MoU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MFCA</td>
<td>Murchison Falls Conservation Area</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Environment Management Authority</td>
</tr>
<tr>
<td>NP</td>
<td>National Park</td>
</tr>
<tr>
<td>PA</td>
<td>Protected Area</td>
</tr>
<tr>
<td>QECA</td>
<td>Queen Elizabeth Conservation Area</td>
</tr>
<tr>
<td>RRA</td>
<td>Regulated Resource Access</td>
</tr>
<tr>
<td>TRAFFIC</td>
<td>Trade Records Analysis of Flora and Fauna in Commerce</td>
</tr>
<tr>
<td>UBOS</td>
<td>Uganda Bureau of Statistics</td>
</tr>
<tr>
<td>URU</td>
<td>Unauthorised Resource User</td>
</tr>
<tr>
<td>UWA</td>
<td>Uganda Wildlife Authority</td>
</tr>
<tr>
<td>WCS</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>WFES</td>
<td>Wildlife Friendly Enterprise Scheme (Scenario)</td>
</tr>
<tr>
<td>WOAA</td>
<td>Withdrawal of All Access (Scenario)</td>
</tr>
</tbody>
</table>

Cover photo: One of the project's research assistants interviewing a local farmer, Queen Elizabeth Conservation Area, June 2015
Abstract

Protected areas (PAs) are widely regarded as one of the greatest tools for conservation, providing various forms of economic and ecosystem benefits, and providing a last recluse for some of the last remaining habitats and species. However, amidst these benefits, there is much debate over the social costs of protected areas and their impacts on the wellbeing of local people that live alongside them.

Such costs of protected areas can cause resentment and drive wildlife crime. It is therefore crucial to engage local people in the planning process to investigate the effectiveness of interventions and to determine their potential impacts. Scenario-based interview methods are one way of capturing the possible performance of future policy interventions and were used for this study to investigate the potential effectiveness of future policy interventions that targeted the drivers of wildlife crime in Uganda.

This study suggests that attitudes towards conservation at Murchison Falls and Queen Elizabeth Conservation Areas are driven by the costs of the protected areas, despite the benefits conservation interventions might provide. It argues that by tackling economic poverty and perceived injustice through reducing human wildlife conflict and facilitating agricultural improvements, people and park relations could be improved and the probability of engagement in wildlife crime could be reduced.

Word Count: 18,192
Acknowledgements

I am grateful to the Ugandan Wildlife Authority and the Uganda National Council for Science and Technology for allowing me to conduct this research, and to the International Institute for Environment and Development and the UK governments Darwin Initiative for granting funding.

I thank the Wildlife Conservation Society (WCS) Uganda for logistical support whilst in the field and the all of the WCS field team and research assistants who were a pleasure to work with. Particular thanks go to my research assistants Ernest Oniba and Steven Twikiriza who were both invaluable, and to the people of Murchison and Queen for participating in this study ~ Afwoyo & Wasinge.

I thank my supervisors, E.J Milner – Gulland and Henry Travers, for giving me the opportunity to undertake this research and for their continued guidance throughout. Thank you also to the wider project team for their insights and to the Mwedde family for making me so welcome in Uganda ~ Weebale. Additional thanks also go to Henry Travers for the use of his dataset for this research, for support in the field and for the pizza!

A final thanks go to my wonderful friends and family for their continuous encouragement and support. Particular thanks go to Nan and Pop for your never ending generosity, to Shun, Suzie and Janani for the reassurance, guidance, chocolate and chai (!) and to Rikki for your continued support throughout and for seeing me through, I couldn’t have done it without you.
1. Introduction

1.1. Problem Statement

Over the past 50 years, ecosystems have been altered by humans more than at any other point in history, to the point that today, there are no ecosystems on earth that are not impacted in some way by man (Collins et al., 2010; Palmer et al., 2005; Vitousek et al., 1997). The ultimate drivers of biodiversity loss involve complex human interactions so understanding these interactions, and subsequently, the effectiveness of interventions aimed at reducing any resulting negative impacts, will play a vital role in determining the fate of biodiversity (St John, Keane & Milner-Gulland, 2013).

Socio-ecological systems however are fundamentally complex and when such complexities are unaccounted for, conservation interventions can, and have, failed (Fulton et al., 2011). This not only jeopardises the long term success of conservation, but, in some cases, can also exacerbate human poverty (Adams et al., 2004; Fiallo & Jacobson, 1995). The complexities of these socio- ecological systems is all too evident when looking at the management of protected areas (PAs), which are established to protect particular habitats or threatened species, often to the detriment of people who neighbour these areas. This well-known ‘park vs people’ debate has been documented extensively (Adams & Hutton, 2007; Roe & Elliott, 2004; Sanderson & Redford, 2003; Schwartzman, Nepstad & Moreira, 2000) and highlights the need to achieve an equitable balance between the wellbeing of local people and the conservation of habitats and wildlife (Minteer & Miller, 2011). This debate is of particular relevance when addressing wildlife crime within protected areas as natural resources can play a major role in the livelihood strategies for many local people.

Natural resources provide a source of food, income and cultural importance for people and can act as a safety net in times of adversity and periods of food insecurity (Lindsey et al., 2013; Vedeld et al., 2012; Aiyadurai, Singh & Milner-Gulland, 2010; Van Vliet & Nasi, 2008; Long, 2004). These socio-economic and cultural values mean that when access to natural resources are denied, local people
may feel they have little or no alternative but to obtain them illegally (Harrison et al., 2015).

These smaller scale crimes, such as locally driven bushmeat hunting, can be very damaging for the viability of protected areas (Hilborn et al., 2006). Overharvesting is one of the primary threats to vertebrates in tropical ecosystems (Tranquilli et al., 2012; Fa & Brown, 2009; Hilborn et al., 2006) with up to 60% of mammalian species thought to be harvested unsustainably (Fa, Peres & Meeuwig, 2002). Law enforcement is widely used to tackle illegal activities within protected areas (Steinmetz et al., 2014) but such an approach can run the risk of disproportionately negatively impacting the people who engage in wildlife crime for subsistence needs and can erode the relationship between local people and protected areas (Infield & Namara, 2001).

An alternative approach to managing protected areas is seen in the form of Integrated Conservation and Development Projects (ICDPs) that typically aim to offer benefits to communities in exchange for community support for conservation (Newmark & Hough, 2000). Whilst their primary objectives are not centred on reducing wildlife crime, they can reduce people – park conflicts and can be an indirect approach to engage communities in tackling illegal activities (Newmark & Hough, 2000). However, ICDPs have been trialled with varying forms of success (McShane et al., 2011; Salafsky, 2011; Brown, 2003; Hughes & Flintan, 2001; Wainwright & Wehrmeyer, 1998). This highlights the need to gain an understanding of the likely impacts of interventions before implementation. Poorly planned policy interventions can affect people’s attitudes towards protected areas and can increase people’s propensity to engage in wildlife crime (Twinamatsiko et al., 2014).

It is therefore crucial to engage local people in the planning process to investigate how households living in communities in and around protected areas might react to future conservation interventions and policies, and what impact these policies could have for them (Lewis et al., 1996). This can allow us to predict responses to management interventions (Fulton et al., 2011) and hence estimate the effectiveness of a conservation intervention before it is implemented, saving time and money, and preventing the loss of trust from local people, which once lost is hard to regain.
This study will use Murchison Falls Conservation Area (MFCA) and Queen Elizabeth Conservation Area (QECA) in Uganda as a case study to investigate the efficacy of potential future protected area interventions in terms of reducing wildlife crime and the impacts for local people. Studies have shown that in both parks, wildlife crime in the form of wild meat harvesting is an important part of people’s livelihoods, contributing between 21-48% of average incomes for some people (Olupot, McNeilage & Plumptre, 2009). However, interventions introduced to tackle the problem are failing to reduce such crimes and in some instances are driving it further (Harrison et al., 2015). These protected areas provide an interesting opportunity to investigate the potential effectiveness of future conservation policies aimed at reducing wildlife crime, whilst also benefitting local people living in and around protected areas.

St John, Keane & Milner-Gulland (2013) note the need for conservation to ‘be able to predict human reactions to conservation interventions’. In order to do this we need an improved understanding of human behaviour and what factors might drive decision making. However, predicting the future responses of people to differing policy interventions can be difficult. Human decision-making has often been viewed through a ‘rational’ economic lens when considering wildlife crimes (Damania, Milner-Gulland & Crookes, 2005). For example, conservation interventions are often designed to maximise the cost associated with an illegal behaviour, such as fines and arrests, so that it outweighs any benefit. However, humans are not financially rational beings who weigh up the costs and benefits of every decision in purely economic terms. Other social- psychological considerations need to be understood (St John, Edwards-Jones & Jones, 2011).

Scenario-based interview methods can capture economic decision making, but they also allow for non-economic, heterogeneous characteristics of decision-making behaviours to be captured. Their semi-structured nature allows us to explore not just how people are likely to respond to an intervention, but also why they might respond in a given way e.g. their reasons for compliance vs non-compliance with policies and the subjective norms that could be influencing these reasons, (Cinner et al., 2011). Although limited by their hypothetical nature, and the gap between intended hypothetical behaviour and actual behavioural expression (Ajzen, Brown & Carvajal, 2004), they allow for a policy to be explored directly rather than relying on
assumptions about how the intervention might change or influence attitudes or behavioural intentions. They are therefore useful as planning tools (Peterson, Cumming & Carpenter, 2003) and allow for conservation policy to be explored prior to implementation. By understanding how interventions might perform, strategies with increased resilience can be developed (Travers, 2014; Peterson, Cumming & Carpenter, 2003).

1.2. Project Aims and Objectives

Taking Uganda as a specific case study, this research forms part of a wider project, which aims to “ensure policy makers have the tools and capacity to understand the interactions between wildlife crime, biodiversity and poverty so they are more able to target interventions that are pro-poor and accrue long-term benefits for rural communities”.

By investigating the potential performance of alternative policy options through scenario interviews, this research aims to achieve an improved understanding of different interventions in reducing wildlife crime, whilst at the same time, benefitting residents of front line parishes who live on the borders of national parks. By understanding how people might change their behaviour or willingness to work with park authorities under certain policies, we can draw conclusions as to whether they might be more or less likely to engage in wildlife crime under certain policies and the socio-cultural impacts that particular policies could have for them.

Using MFCA and QECA in Uganda as case studies, the study aims to contribute to the broader project question: “In the eyes of local people, government and conservation managers, which interventions are most effective in reducing wildlife crime and contributing towards poverty alleviation?”

Specifically, the study aims to meet the following objectives:

1) Investigate the response of park adjacent households to potential future conservation interventions with respect to labour allocation and participation in informer networks.
2) Examine which demographic factors influence how households might react to these future scenarios.
3) Investigate how responses to future scenarios could impact the drivers of wildlife crime around MFCA and QECA.

4) Understand which conservation policy option(s) or intervention(s) could be effective in tackling wildlife crime around MFCA and QECA, whilst ensuring fairness and minimising negative impacts on local people.

1.3. Structure of Thesis

This thesis will take the following structure. Chapter two will provide an overview on conflicts between protected areas and people, giving examples of the current people and park conflicts that drive illegal activities in Ugandan protected areas, and the current interventions being used in Uganda and internationally to tackle the problem. Chapter three will explain the methods used in this study and will introduce the scenarios. Chapter four will present the results obtained and chapter five will explain them, examining the opportunity for reforming protected area interventions at MFCA and QECA.
2. Background

2.1. People and Protected Areas

Protected areas (PAs) are widely regarded as one of the most important tools for conservation, with a huge drive to increase the total area designated for conservation seen over the past 50 years (Dudley et al., 2014). The creation of protected areas can bring many benefits in the form of biodiversity and ecosystem services (World Resources Institute, 2005) yet, amidst these benefits, there is much debate over the social costs and impacts on the wellbeing of local communities (Clements et al., 2014; Naughton-Treves, Alix-Garcia & Chapman, 2011). Studies have shown how protected areas can have multiple impacts on local communities including displacement, restricted access, conflicts with wildlife and cultural declines (Bennett, 2010; Coad et al., 2008; Adams & Hutton, 2007). Setting aside these areas therefore has social and economic implications and, whilst benefits exist, they largely accrue at the national and global scale, whilst the cost of protected areas is born locally (West, Igoe & Brockington, 2006; Balmford & Whitten, 2003).

2.2. The Cost of Protected Areas in Uganda

2.2.1. Human Wildlife Conflict

When human and wildlife populations overlap, interactions between the two can influence attitudes and behaviour (Kahler & Gore, 2015) and resulting concerns can impact the tolerance human populations have for certain species (Kansky, Kidd & Knight, 2014). Human Wildlife Conflict (HWC) has been shown to prevent economic development, social equality and resource sustainability (Redpath et al., 2013), and is a long standing problem in Uganda.

For many of the districts surrounding both MFCA and QECA, population densities are high, forcing people to farm land right up to the border of the protected areas (Kato & Okumu, 2008). This results in high levels of conflict with wild animals and a study by Olupot, McNeillage & Plumptre (2009) found that crop raiding was cited as the most important factor driving bushmeat hunting at MFCA. At Bwindi National
Park, local people identified crop raiding as a major cause of low quality of life and being without basic necessities, causing resentment and fueling illegal resource access (Twinamatsiko et al., 2014; Blomley, 2010). There is no compensation of any kind issued for crop raiding or livestock damages, which results in high feelings of perceived injustice. Infield & Namara (2001) reported how this lack of compensation can create negative attitudes and can lead to implicit or active support for poaching.

2.2.2. Resource Restrictions and Illegal Incursions

Despite a declining trend in the number of people living below the poverty line, 20% of Uganda’s population still live in poverty and 89% of these live in rural areas (UBOS, 2014). This means that for the districts that surround protected areas, poverty levels are often higher than the national average. For example, the number of people living below the poverty line in the West Nile sub region surrounding some districts of MFCA is nearly double the national average (UBOS, 2014) and the northern region of Uganda has suffered from long-term insecurity due to the presence of the Lord’s Resistance Army and the border with South Sudan. The restriction of access to natural resources can therefore have negative impacts for poor communities living next to protected areas in Uganda. People lack the resources they need, and the money to buy them, so may feel they have little or no option but to resort to illegally harvesting resources from protected areas (Harrison et al., 2015).

Within Uganda, Harrison et al (2015) found evidence for 31 resources being illegally harvested. Evidence from studies of communities living in and around protected areas in Uganda indicate that bushmeat is one of the main resources that rural households illegally obtain in order to meet their dietary needs (Twinamatsiko et al., 2014; Tumusiime, Vedeld & Gombya-Ssembajwe, 2011; Olupot, McNeilage & Plumptre, 2009). After bushmeat hunting, the most prevalent reasons for illegal encroachment into protected areas are for firewood collection, timber and building poles harvesting, grazing cattle and charcoal production. These resources are either used directly to meet household subsistence needs, or sold to generate income to pay for resources or services (Twinamatsiko et al., 2014). Other resources are harvested when people cannot afford manufactured substitutes. For example, grass
is collected from some protected areas for use as thatch by households that cannot afford iron sheets (Kabagumya, 2001).

2.2.3. Cultural Conflicts

The use of natural resources and the hunting of wild animals can be an integral part of cultural heritage for many communities across the world and this can maintain demand for wild resources and drive illegal resource use (Twinamatsiko et al., 2014). Across Uganda, medicinal plants have historically been used to treat illnesses, and many can no longer be found outside protected areas (Twinamatsiko et al., 2014; Eilu, Oriekot & Tushabe, 2007; Ssegawa & Kasenene, 2007). Additionally, for some, the killing and eating of bushmeat is seen as a cultural activity and is associated with becoming a man and appeasing ancestors (Moreto, 2013; Kairu, 2005; Kabagumya, 2001). Olupot, McNeilage & Plumptre (2009) found that the bodies of animals were used for creating instruments and craft materials. Jones (2013) found that the skins from monkeys, kobs and leopards may be poached for cultural rituals.

These protected area conflicts feed into the five main drivers of wildlife crime in Uganda identified by Harrison et al (2015); To meet basic needs; a desire to obtain wealth above and beyond basic necessities; in response to Perceived Injustice; Culture and Traditions and Political Influence (see Appendix I for a detailed description). The socio-economic context and why people are engaging in wildlife crimes in protected areas is fundamental to consider if policy interventions are to be designed and targeted effectively.

2.3. Protected Area Policies and Wildlife Crime Interventions

High poverty rates have been documented around protected areas and the link between conservation and poverty was cemented in policy when the 10th Conference of Parties of the Convention of Biological Diversity encouraged parties to ‘support initiatives on the role of PAs in poverty alleviation’ (Decision X31) in the 2011-2020 Strategic Plan (Baker et al. 2013). It remains largely undetermined however as to whether high poverty rates are a result of protected areas or due to other underlying factors (Naughton-Treves, Alix-Garcia & Chapman, 2011). Whilst links between poverty and wildlife crime have been seen, they are under researched,
with little ‘hard evidence’ to support them (Duffy & St John, 2013). What is clear is that protected areas can have negative impacts for the people living around them and a failure to address these impacts can lead to negative attitudes towards conservation and can drive various forms of wildlife crime (Twinamatsiko et al., 2014). Understanding how interventions can impact local people is therefore critical to the long-term success of conservation but robust methods which aim to do this are rarely seen (Clements et al., 2014).

2.3.1. Law Enforcement

Both internationally and in Uganda, one of the most commonly used conservation interventions is law enforcement (Steinmetz et al., 2014). It is regarded by many to be a key intervention in tackling wildlife crime and protecting biodiversity (Dudley, Stolton & Elliott, 2013; Tranquilli et al., 2012; Fischer, 2008; Hilborn et al., 2006; Gibson, Williams & Ostrom, 2005). There is evidence that where there is poor law enforcement, biodiversity can be reduced (Peres & Terborgh, 1995) and in Africa, it has been recognised to be a critical component in the monitoring and management of protected areas (Hilborn et al., 2006; Norgrove & Hulme, 2006; Brockelman et al., 2002). With the scale and extent of wildlife crime increasing, in recent years there have been calls to scale up law enforcement efforts (Dudley, Stolton & Elliott, 2013; Fischer, 2008).

However, whilst it is clear that law enforcement is an essential component for tackling larger scale commercial wildlife crime, a blanket approach can disproportionately impact the rural poor involved in wildlife crime who may have little or no alternative and are engaging in wildlife crime for subsistence needs (Harrison et al., 2015; Infield & Namara, 2001). There is also evidence to suggest that law enforcement within protected areas is subject to corruption and misconducts by authority figures (Moreto, Brunson & Braga, 2015). This can erode the trust between local people and protected areas and influence the non-compliance with conservation rules (Gore, Ratsimbazafy & Lute, 2013).

2.3.2. Key Informant Networks and Collaborative Law Enforcement

Engaging communities in aspects of law enforcement can be a successful approach to assist with the management of protected areas (Holmern et al., 2002; De Lopez,
2001; Lewis, Kaweche & Mwenya, 1990). Village game scouts (VGS) have proved successful in the Serengeti due to local knowledge that improved the detection rates of illegal activities (Holmern, Muya & Røskaft, 2007). The Ruvuma Elephant project in Tanzania is another example of where collaborative law enforcement patrols have been successful, resulting in reciprocal support for conservation (Jenes & Lotter, 2015). Key Informant networks can also be an effective tool for conservation, ensuring patrolling effort is well targeted and that poachers can be apprehended before animals are lost (Dudley, Stolton & Elliott, 2013). Forsyth (2008) demonstrated the importance of informants being vital to enforce wildlife conservation laws. Involvement of local people is not without risk however, with corruption always a possibility and stories of community rangers being shot and their homes destroyed (Jenes & Lotter, 2015; Holmern, Muya & Røskaft, 2007). Assessing the potential support for such an approach before implementation is therefore important.

2.3.3. Integrated Conservation and Development Projects (ICDPs) in Uganda

There is evidence to suggest that where local people do not play a role in wildlife management, or where wildlife generates no benefits, there will be strong incentives for illegal use (Roe, 2015). By improving the economic and social value of wildlife for local people through ICDPs, they may be more motivated to support and engage in conservation efforts. Despite their challenges (McShane et al., 2011; Salafsky, 2011; Brown, 2003; Hughes & Flintan, 2001; Wainwright & Wehremeyer, 1998) there are many examples where such approaches have proved successful (Lewis et al., 2011; Brown et al., 2011; Blomley, 2010; Morgan-Brown et al., 2010; Lewis, 2007). Within Uganda, the main variants of ICDPs currently in use are Regulated Resource Access (also known as Multiple Use Programme) and Revenue Sharing.

2.3.3.1. Regulated Resource Access

Regulated Resource Access (RRA) permits local people to harvest certain types of resources within Ugandan National Parks according to restrictions drawn up in a Memorandum of Understanding (MoU) with community groups which allows communities to access specified resources. Examples include: fish from Lakes Nyamusingiri and Kyasanduka and regulated harvesting of ambatch and pragmites, medicinal plants and dead firewood by the Kayanja resource user group in QECA. A
clause of the MoUs is that resource users are responsible for monitoring the illegal harvesting of park resources and other illegal activities within the park, and must report them to the resource user committee and protected area management (UWA, 2009).

The impact of RRA on illegal activities is unclear, with both evidence for RRA reducing illegal activities and for RRA having no effect. For example, in Kibale National Park, resource users were reported to remove snares and report illegal activities to authorities (Chhetri, Mugisha & White, 2003) but recently two resource sharing agreements were terminated as members were found conducting illegal activities at the same time (Mackenzie, Chapman & Sengupta, 2012).

2.3.3.2. Revenue Sharing

Since 2000, 20% of the park entrance fees received from tourists have been shared with the parishes that neighbour PAs. According to the most recent revenue sharing guidelines (UWA, 2012a), the overall goal of revenue sharing is to “ensure strong partnerships between protected area management, local communities and local governments leading to sustainable management of resources in and around protected areas by enabling people living adjacent to protected areas to obtain financial benefits derived from the existence of these areas that contribute to improvements in their welfare and help gain their support for protected area conservation.”

Examples of projects funded through the revenue sharing process include provision of schools, health centres and roads; provision of protected water sources and support for livestock rearing. There is some evidence that revenue sharing projects can reduce illegal activities (Harrison, 2013; Blomley, 2010; Archabald & Naughton-Treves, 2001) but there is also evidence that the process is failing to benefit communities who suffer the highest costs, money is lost to corruption, and even if it does reach communities, it is not shared equitably. This has been shown to worsen economic inequality through elite capture which can motivate people to engage in further wildlife crime (Tumusiime & Sjaastad, 2014).
Resentment arose at Bwindi National Park over the revenue sharing programme, with victims of crop raiding believing that they were not benefitting from the scheme and that revenue sharing should be implemented as compensation for crop losses. Those who perceived that they had not benefitted from revenue sharing listed the inequity of the process as one of the reasons why they engage in hunting (Twinamatsiko et al., 2014). Despite recommendations in UWAs management plan that revenue sharing funds should be directed towards addressing human wildlife conflict, there is nothing in place that makes this a requirement.

2.4. Livelihoods Investments; a Wildlife Friendly Approach?

Livelihood enterprise schemes aim to improve livelihoods and make engagement in activities other than wildlife crime more profitable. In Equatorial Guinea, Kumpel et al (2010) illustrated that hunting serves as a temporary or long-term fall-back in times of financial need and when jobs are not available locally, with the vast majority (66%) of hunters in the study stating a lack of alternative ways to make money as their primary reason for hunting. A similar finding was found in North East Gabon, where hunting activity decreased when hunters were occupied by other economic activities (Van Vliet & Nasi, 2008). In the Serengeti, 75% of hunters attributed participation in hunting to income needs and households with an alternative means of generating an income were less likely to be involved in illegal activities (Loibooki et al., 2002). Knapp (2007) also found that income shortfall led individuals to poach (86%) and households engaged in poaching had no family members in full time employment.

Barrett and Arcese (1998) developed a model coupling wildlife population dynamics to endogenous human consumption and poaching behaviour under different labour and agricultural conditions. Interventions that directly tackle the issue of inconsistency in agricultural labour allocation offered a more effective long term solution to wildlife crime compared to managed wildlife harvest schemes. When few or no alternative income sources existed, people were predicted to kill protected species, especially when exogenous shocks supressed farm work.

Travers et al (in prep) found that participation in wildlife crime in Uganda is linked to the availability of household labour, and to the allocation of labour to other livelihood
activities; the less time an individual spent on their livelihood activity, the more likely they were to engage in wildlife crime, with hunting occurrence being highest during periods of farming inactivity. Conservation interventions that have the ability to increase household labour allocation to livelihood activities could therefore lower the probability of participation in wildlife crime, with labour allocation acting as a proxy measure for a household’s propensity to engage in illegal activities.

2.5. Ensuring Equity

Assessing the costs and benefits of conservation has often been framed in economic terms, with research using narrow monetised approaches to assess the impacts of conservation interventions on local people. However, when conservation efforts affect cultures and peoples’ ways of life, and where society is formed of poor communities who may lack power, it is important for conservation to take into account a wider range of impacts, for example, the social and cultural implications of interventions (Milner-Gulland et al., 2014). The evidence from Uganda suggests that attitudes and behaviours towards conservation are strongly shaped by the perceived injustice communities face, whether that be from a cost of a protected area such as the damage caused by crop raiding, or due to the perceived unfairness of a conservation intervention which aims to tackle it. It is therefore important to consider the perceived equity of conservation interventions, as failing to do so can drive feelings of injustice, result in conflicts between protected areas and people, and ultimately drive further wildlife crime.

When designing interventions that are subject to so many uncertainties, it is vital to consult the very people the intervention is targeting to avoid misguided assumptions and unexpected surprises (Peterson, Cumming & Carpenter, 2003).

2.6. Scenario Planning and the Effectiveness of Future Policy

Conservation planning can be a challenging prospect (Bohensky, Reyers & Van Jaarsveld, 2006) and uncertainties are particularly apparent when working with socio-ecological systems in which unexpected outcomes are common due to factors such as nonlinear feedbacks, strategic interactions, and individual and spatial
heterogeneity (Levin et al., 2013). Planning can often fail to fully consider the entire extent of local conditions or the propensity for new situations to create unexpected surprises (Peterson, Cumming & Carpenter, 2003). Piloting a conservation project can be one way to provide predictions as to how an intervention might perform but it can take time to achieve a detectable change and even if detected, it can be difficult to distinguish an interventions impact from other drivers.

As narratives that describe alternative pathways to the future, scenarios offer a promising collaborative approach for building resilience to the future’s unpredictability (Bohensky, Reyers & Van Jaarsveld, 2006) and can help us understand and manage socio-ecological systems that are characterised by high levels of complicated uncertainty and low levels of controllability (Peterson, Cumming & Carpenter, 2003). Scenario analysis can be used in an interdisciplinary manner. For example, to address resource management questions about possible future conditions or to understand how an individual’s behaviour might change in response to hypothetical future changes. These changes could reflect an extrapolation of current trends or introduced changes, such as policies or management plans.

Scenarios can provide a framework for anticipating the future and can be defined as ‘stories or snapshots of what might be’ (Wollenberg, Edmunds & Buck, 2000). For example, scenarios can present a group of plausible, situation-specific policies and can both qualitatively and quantitatively examine how these changes may affect respondents, and how they would act in response to them; allowing both economic and non-economic characteristics of human decision making to be captured which other utility based economic models may miss (Travers, 2014; Cinner et al., 2011). They also provide the basis for discussions about costs and benefits associated with alternative interventions or policies and stimulate creative ways of thinking that help stakeholders to break out of established patterns of assessing situations and planning actions, so that they can better adapt to the future (Carpenter, Bennett & Peterson, 2006; Wollenberg, Edmunds & Buck, 2000).

Recently, scenario based interviews have been used in conservation to examine farmer land clearance under different payment policies in Cambodia (Travers, 2014), hunter responses to landscape level change in Ghana (McNamara J., 2014) policy
and change in bushmeat hunting in the Congo (Evans, 2014), motorised subsistence hunting in Alaska (Shanley, Kofinas & Pyare, 2013) and fisher decision-making in coastal East Africa (Cinner et al., 2011).

2.7. Study Locations and Management

Located in East Africa and neighboured by Rwanda, the Democratic Republic of Congo (DRC), South Sudan, Kenya and Tanzania, Uganda has a total area of 241,551 km² and is one of Africa’s fastest-growing countries (UBOS, 2014). Driven by a high fertility rate of 6.2%, Uganda’s population has risen from 9.5 million in 1969, to 34.9 million in 2014, and is projected to reach 91.3 million by 2050 (UBOS, 2014). Of these 34.9 million people, 77% live in rural areas resulting in livelihoods dominated by subsistence agriculture. The national economy and the livelihoods of the people are therefore closely linked with the natural environment, highlighting the need to find long term, sustainable solutions to protect Uganda’s biodiversity.

Agriculture currently accounts for 22.5% of GDP, 48% of exports, and 68% of household livelihoods (NEMA, 2010).

Uganda is considered to be one of the most biodiversity-rich countries in the world (Ruhanga & Manyindo, 2010; Howard et al., 2000) and is protected through ten national parks, 12 wildlife game reserves, ten wildlife sanctuaries, five community wildlife areas, 506 central forest reserves and 191 local forest reserves which account for over 10% of Uganda’s total area (MoTWA, 2014).

This study used Murchison Falls Conservation Area and Queen Elizabeth Conservation Area as case studies to investigate responses to future conservation policies (Figure 2.1). Both conservation areas are managed by the Ugandan Wildlife Authority (UWA).

The Ugandan Wildlife Authority (UWA) is the governing body responsible for the monitoring and management of Uganda’s protected areas, including national parks, wildlife reserves, sanctuaries and community wildlife areas. UWA is also responsible for the management and conservation of wildlife species within and outside of protected areas, promoting and enhancing the socio-economic benefits of wildlife management, responding to problem species and enforcing and implementing
relevant international treaties, conventions or other arrangements to which Uganda is party to (Kameri-Mbote, 2005).

![Map showing study locations within Uganda](image)

**Figure 2.1. Map showing study locations within Uganda**

### 2.7.1. Murchison Falls Conservation Area

Murchison Falls Conservation Area (MFCA) is the most visited and largest protected area in Uganda, situated at the northern end of the Albertine Rift. It is comprised of Murchison Falls National Park (3,893 km²), Karuma Wildlife Reserve (678 km²) in the east and south east, and Bugungu Wildlife Reserve (474 km²) in the southwest (UBOS, 2014). Elephants, hippos, buffalos, Jackson’s hartebeest, Uganda Kob, bushbuck and waterbuck, and the only viable populations of Rothschild’s giraffe and the Nile crocodile in Uganda are found at MFCA (Olupot, McNeilage & Plumptre, 2009).

In agricultural areas, land is farmed right up to the edge of the protected area whereas in the mostly pastoral western areas, vegetation transition from the protected area to community land is not as abrupt (Olupot, McNeilage & Plumptre, 2009).
2.7.2. Queen Elizabeth Conservation Area

Queen Elizabeth Conservation Area (QECA) lies in the western rift valley at the southernmost tip of the Rwenzori Mountains. Predominant features of this site are Lake George in the North and Lake Edward to the south. The western side of the area borders the Democratic Republic of the Congo (DRC), the border of which runs through Lake Edward. The conservation area is comprised of Queen Elizabeth National Park (1,978 km²), Kyambura Wildlife Reserve (154 km²), and Kigezi Wildlife Reserve (269 km²) and is 2,401 km² in size (Rwetsiba et al., 2002).

To the west, the areas adjoining the park boundary are predominantly pastoral, while those in the east are predominantly agricultural. The distinction between the conservation area and surrounding lands is more abrupt on the eastern side, with land cultivated right up to the boundary (Olupot, McNeilage & Plumptre, 2009).
Figure 2.3. Wildlife and People living side by side at Queen Elizabeth Conservation Area
3. Methodology

3.1. Methodological Approach

This research uses a socio-ecological framework to analyse how people living in park adjacent communities might respond to scenarios of future policy change. A semi-structured, scenario-based interview approach was used to understand the potential impacts of these changes on people living around protected areas (Cinner et al., 2011). The interview presented five hypothetical scenarios of change to generate stated household responses to possible future conservation policies. Follow up questions were asked to understand 1) how people perceived they would be impacted by the protected area (positively or negatively) under each scenario 2) how equitable respondents perceived each scenario to be and 3) how likely respondents would be to inform UWA about wildlife crimes under the scenarios.

3.2. Sampling

Villages across 12 districts were surveyed during this study; 23 villages from MFCA and 23 villages from QECA (Figure 3.1 and Figure 3.2 respectively)

![Figure 3.1. Map showing study site of MFCA and study villages](image-url)
Villages were randomly selected from a list of villages previously surveyed as part of the initial stage of the overall research project. These villages were included due to their proximity to the conservation area and either bordered the conservation area or had over 50% of their total area within three kilometres of the boundary. Village lists were stratified by district, with the number of villages selected based on the proportion of the total conservation area boundary that passed through each district. All respondents surveyed as part of this research had previously participated in a household socio-economic survey as part of the wider research project and had given their consent to be interviewed for a second time. As such, it was possible to ensure that an equal proportion of households from each poverty score quintile were interviewed.

Three respondents per village were randomly selected to be interviewed from the list of individuals previously interviewed, with replacement households randomly selected from the list in cases where selected individuals were unavailable in order to ensure a viable sample size. For each village, the chairperson (the political
representative for government at village level) was contacted in advance to obtain permission to conduct the research and to assist in locating respondents. In some villages it was not possible to sample three respondents, as multiple respondents were unavailable. This was not deemed to be an issue, as comparisons were not made at the village level. In total 119 individuals were interviewed.

3.3. Scenario Interview

All Interviews were semi-structured, with respondents presented with a baseline ‘business as usual’ scenario and a further five scenarios that presented future hypothetical conservation interventions and policies. Evidence from cognitive research indicates that people are only capable of comparing a maximum of five to nine scenarios at one time (Stewart & Scott, 1995) and most authors suggest comparisons of three to nine scenarios depending on the purpose of the research (Wollenberg, Edmunds & Buck, 2000). Each scenario was presented one by one and the respondent was asked to qualitatively explain how they would react to the scenario in terms of their labour allocation to their livelihood practices. Follow up questions were then asked to ensure the respondent fully understood the scenario. This was followed by a multiple choice answer with three options; increase labour allocation; decrease labour allocation or no change in labour allocation.

Follow up questions focussed on i) the perceived equity of the scenario in order to understand how future interventions could influence feelings of injustice and ii) how willing respondents would be to collaborate with protected area authorities under the scenario. Respondents were asked to rate the scenario using a Likert scale in terms of: i) its fairness ii) the impact that they perceived the conservation area would have on them and their household under that scenario and iii) how likely they would be to report on wildlife crime under that scenario. Further questions were then asked to understand the reasons behind the answers given. The scenarios were presented in five alternative orders in order to prevent any biases in responses due to the question ordering. This methodological variable of question order was included in the statistical analysis to check for bias in the questioning and was confirmed to have no influence on responses. Two research assistants, one at each site, were used to conduct the interviews in local languages, with the author leading follow up
questioning. Both field assistants were fluent in English and the local languages relevant to the two conservation areas. Each participant was given a bar of soap at the end of each interview to compensate them for their time.

Schoemaker (1993) observed that scenarios work well because of their cognitive appeal as stories or metaphors and scenarios. However, these well told stories can risk raising expectations and generating a view that implementation of the policies presented in the scenarios is more probable than it is in reality. It was therefore stressed throughout each interview that the scenarios were hypothetical for the purpose of research and UWA are under no obligation to implement any policy option discussed, nor were the research team connected to UWA in any way. Confidentiality was assured as, even though respondents were not asked about their involvement in wildlife crime directly, the protected area conservation can be a sensitive issue in Uganda (Baker. J, pers com). Interviews were conducted with informed consent, and all respondents’ names will remain anonymous.

3.4. Pilot Study

The scenario interview was piloted on 10 respondents across five villages which neighbour MFCA to check for understanding, to clarify any translation issues, and to refine the language used. Four pilot interviews were also conducted at QECA which allowed the second research assistant to become comfortable with the interview structure and highlight any difficulties with the translation to local dialects. One question relating to the time respondents would spend in the park under each scenario was removed from the interview as it was felt this was making respondents uncomfortable and hindering the flow of the interviews.

3.5 Scenarios

According to Wollenburg (2000) scenarios should be internally consistent, coherent, plausible and feasible. The scenarios developed were therefore based on interventions that could work within the Ugandan context as, whilst creativity is a key part of developing scenarios, policy options need to be feasible and relevant for the specific context, linked to the present situation and understandable by the scenario user. The five future policy scenarios used were chosen during the initial stage of
this study based on examples from the literature from both the Ugandan context and internationally, and were designed to target the drivers of wildlife crime specifically for Uganda, as highlighted in the literature and evidence review undertaken by Harrison et al., (2015). Scenario options were then decided through consultation within the project team (see Appendix III for full interview structure).

3.5.1. Revenue Sharing Funds Directed to Human-Wildlife Conflict (HWC) Mitigation

This scenario was designed to investigate attitudes towards allocating either 25% or 50% of the revenue sharing funds to human wildlife conflict, rather than being spent on development type projects as it does currently. Under this scenario, districts would be required to spend either 25% or 50% of their revenue sharing allocation on preventing wildlife mitigation measures, money would therefore be diverted from development type projects so there would be less money available for projects such as schools and roads, meaning that those not directly impacted by human wildlife conflict could be negatively impacted by this diversion of funds.

Hypothesised Relationships

1a) non – farming households will be opposed to allocating revenue sharing funds to human wildlife conflict [non-farming households are not impacted by human wildlife conflict]

1b) farming households will be in favour of allocating 25% of revenue sharing funds to HWC mitigation [50% will be too much money to remove from development projects]

1c) fairness levels will increase for farming households comparative to business as usual [people will perceive this to be a fair policy]

3.5.2. Increased Utilisation of Natural Resources (Sustainable Hunting)

This scenario was designed to expand resource sharing agreements to promote the sustainable utilisation of specific bushmeat species to increase benefits accrued by communities, help people meet their livelihood needs, and provide a legal way to address the cultural and traditional driver of wildlife crime. This is based on the assumption that increasing benefits will reduce community resentment, improve people-park relations and increase willingness to support wildlife crime mitigation.
Under this scenario, it was explained that the wildlife authorities would expand agreements to allow some bushmeat species to be hunted using permitted species specific methods, for example, using spears to hunt Uganda Kob. Hunting would be purely for consumption within the home. Penalties would be introduced and permits revoked if snares were found or if people were caught illegally harvesting resources without permission. The policy would be dependent upon further research to establish sustainable offtake levels which are not currently known. Hunting would be on a regulated basis, governed by research and would take place in permitted zones only.

_Hypothesised Relationships_

2a) **Fairness ratings will increase comparative to business as usual** [with evidence that around 40% of the population engage in hunting, providing a legal alternative will be received by the study population as fair]

2a) **Perceptions of positive park impacts will increase comparative to business as usual scenario**

2c) **Labour allocation to main livelihood will be correlated with age, with younger respondents more likely to participate in a sustainable hunting scheme and so will decrease their labour allocation to other activities**

2d) **Respondents will be more likely to report on wildlife crimes comparative to business as usual due to improved people-park relations**

3.5.3. **Withdraw of All Access to Resources**

In contrast to the scenario above, this scenario was included to explore the potential impacts of withdrawing all current access to natural resources in order to estimate how people currently value regulated resource access. Under this scenario it was explained that permits and MoUs would be revoked for all resource users and no access to the park would be allowed for any reason. Anyone found in the park would be there illegally. This scenario was included to both understand how resource users value the current levels of resource access and also to provide a negative scenario in order to ensure the scenario approach was working effectively.
Hypothesised Relationships

3a) fairness ratings will decrease comparative to the business as usual scenario

3b) perceptions of negative park impacts will increase comparative to the business as usual scenario

3c) levels of participation in informer networks will decrease comparative to the business as usual scenario

3.5.4. Wildlife Friendly Enterprise Scheme (WFES)

This intervention would work to create an economically viable, incentive based scheme to address the subsistence and commercial drivers of wildlife crime, and would be based on the condition that people do not partake in illegal activities. Such an intervention would replicate product based schemes in which consumers pay a “green premium” in addition to the market price in order to ensure an environmentally friendly product. Green premiums could be adopted for farmers around MFCA and QECA for wildlife friendly products, which would require that products are ‘wildlife crime free’ and hence ‘wildlife friendly’.

Under this scenario, it was explained that the scheme would be open to everyone and would offer a premium price for crops that could help deter problem wildlife (i.e. crops that do not attract problem animals or that can deter them such as sunflowers, chilli or honey). The price premium would be dependent upon the agreement that participants do not participate in wildlife crime; anyone found to have committed an illegal activity would be removed from the scheme for a period of one year. An average predicted income would be 500,000 Ugandan shillings per year.

Hypothesised relationships

4a) labour allocation will increase comparative to business as usual scenario

4b) fairness ratings will increase compared to business as usual scenario

4c) perceptions of positive park impacts will increase comparative to business as usual scenario

4d) respondents will be more likely to report on wildlife crimes comparative to business as usual scenario
3.5.5. Eco – guards and Anonymous Text Scheme

This policy would increase the number of community members employed by UWA by providing targets or stipulations on the number of local people that should be trained and employed in order to improve people-park relations and provide a response to human wildlife conflicts.

Under this scenario, it was explained that UWA would employ two local people as Eco-guards from each village neighbouring the park. Employment would be based on a person’s knowledge of the environment and wildlife. Eco-guards would work with their community and UWA to reduce human wildlife conflict and build relationships between the park authorities and local community. Eco guards would not have power of arrest and their main responsibilities would be to i) respond to human wildlife conflict ii) monitor illegal incursions and iii) check for snares.

Hypothesised Relationships

5a) fairness ratings will be higher comparative to the business as usual scenario [local people are being employed]

5b) perceptions of positive park impacts will increase comparative to business as usual scenario [people will have help responding to HWC]

5c) the probability of informing on wildlife crime will be highest comparative to other scenarios as reporting will be to a known individual in the community

This scenario also investigated how likely people would be to use an ‘Anonymous Text Scheme’. It was explained that the scheme would allow for wildlife crime to be reported anonymously by text in return for a financial reward dependent upon the validity of information. The reward would be issued at two levels dependent upon the scale of the crime; in return for reliable information, the person sending the text would receive a financial reward of 150,000 shillings for the arrest of an ivory poacher and a lower reward of 15,000 shillings would be offered for people who send a text which leads to the successful arrest of people who have been participating in crimes such as bushmeat hunting or timber harvesting.

Hypothesised relationships
6a) the probability of informing by text will be higher than the probability of someone informing by other means

6b) the probability of a person informing on large scale wildlife crime will be higher than small scale crimes due to the scale of reward offered

3.6. Statistical Analysis

To explore the influence of the scenarios and socio-demographic factors on respondent’s labour allocation, likelihood of informing and fairness rating, cumulative link mixed models (CLMMs) were used, fitted with the Laplace approximation (Christensen, 2015). The business as usual scenario was used as a reference point in order to compare responses and indicate either a decrease, no change or increase in the dependent variable for models one and two. Independent fixed effect variables included scenario, poverty score and demographic variables, such as age, gender, conservation area and occupation. Interview order was included as a methodological check and was rejected for all models (see Table 3.1 for a summary of all model variables).

All models were run in R (R Core Team, 2015), using the ordinal package (Christensen, 2015). Model selection was carried out using backwards stepwise selection on the basis of corrected Akaike Information Criterion (AIC) values (Akaike, 1979). Following Burnham & Anderson (2002), if the difference in AIC values between models was less than two, the most parsimonious model was selected. If the ΔAIC values were greater than two, the model with the lower AIC value was selected. Each model was also checked for over-dispersion by comparing the sum of squared Pearson residuals with the approximate residual degrees of freedom.

In each model, an individual random effect was included to account for multiple responses by each individual. Inclusion of a district random effect was tested using likelihood ratio tests and rejected for all models (Bolker et al., 2009). This process was then repeated for the fixed effects, starting with the full set of potential variables and using backwards stepwise regression to remove variables one by one. Wald tests were used to indicate if variables had a strong effect along with the likelihood ratio test to test marginally significant terms and simplify the models (Christensen, 2015).
### Table 3.1. Variables included in cumulative link mixed models (CLMMs)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour allocation change</td>
<td>Ordinal response</td>
<td>1 was defined as increasing labour allocation, 0 was defined as no change, and -1 was a decrease in labour allocation.</td>
</tr>
<tr>
<td>Likelihood to participate in informer networks change</td>
<td>Ordinal response</td>
<td>1 was defined as an increase in the respondent’s likelihood of informing on wildlife crime, 0 was defined as no change and -1 was a decrease.</td>
</tr>
<tr>
<td>Fairness rating</td>
<td>Ordinal response</td>
<td>Fairness rating using a Likert scale with -2 defined as very unfair, -1 unfair, 0 neither fair nor unfair, 1 fair, and 2 very fair.</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario</td>
<td>Five level factor</td>
<td>The future scenario presented to the individual.</td>
</tr>
<tr>
<td>Age</td>
<td>Continuous: integer</td>
<td>Respondent’s age.</td>
</tr>
<tr>
<td>Gender</td>
<td>Two level factor</td>
<td>Respondent’s gender.</td>
</tr>
<tr>
<td>Conservation Area</td>
<td>Two level factor</td>
<td>The CA next to which the respondent lives (MFCA or QECA)</td>
</tr>
<tr>
<td>Poverty score</td>
<td>Continuous: numerical</td>
<td>Respondents’ household poverty score using Basic Necessity Survey (BNS) scores.</td>
</tr>
<tr>
<td>Interview order</td>
<td>Five level factor</td>
<td>The order in which the scenarios were presented to the respondent (methodological check)</td>
</tr>
<tr>
<td>Occupation</td>
<td>Two level factor</td>
<td>Livelihood occupation (‘farmer’ or ‘other’).</td>
</tr>
<tr>
<td>Individual (subject)</td>
<td>Factor, random effect</td>
<td>The individual respondent.</td>
</tr>
<tr>
<td>District</td>
<td>Twelve level factor, random effect</td>
<td>District of respondent.</td>
</tr>
</tbody>
</table>
4. Results

4.1. Business as Usual (BAU)

Under the BAU scenario, under which everything remained constant for the next five years, 40% of respondents predicted a decrease in labour allocation, 55% reported that there would be no changes, and 5% reported an increase. There is significant variation between the two conservation areas, with the majority (52%) of respondents at MFCA predicting a decrease, compared to the majority (71%) of respondents at QECA predicting that there will be no changes (figure 4.1; $X^2 = 12.51$, df = 2, p-value = 0.0019).

![Figure 4.1. Predicted changes in labour allocation under the BAU scenario; comparisons between conservation areas](image)

4.1.1. Impacts of the Conservation Areas on Park Adjacent Households under the BAU Scenario

Under the BAU scenario, 76% of respondents predicted that the conservation areas would have a negative impact on them and their households if the current situation continued for the next five years. Of these people, 70% reported that they would be strongly negatively impacted, with many reporting that they suffer living close to the park.
“If the current situation continues we will suffer as elephants and wild pigs come and destroy our crops and we have no other alternative to pay for things like school fees. All our cassava was destroyed by wild pigs last year…It is not fair as when crops are damaged there is no compensation and you tell the park animals are in the area but they don’t respond. You dig, the animals destroy, you dig again, animals destroy. There is no hope”.

When exploring these results further, there was a significant difference ($X^2 = 14.83$, df = 2, p-value = 0.0006) in how respondents rated the predicted future impact of the conservation areas when comparing between MFCA and QECA. A higher percentage of respondents (82%) at MFCA stated that they would be negatively impacted by the protected area, compared to 70% at QECA. At QECA there was a larger percentage of respondents (28%) who felt they would not be impacted either way by the park.

4.1.2. Fairness Perception under the BAU Scenario

Overall, 79% of respondents viewed the BAU situation as unfair, 5% didn’t think it was either fair or unfair, and 16% viewed it as fair. There was a slight difference between the responses of the respondents from the two differing conservation areas but these differences were not significant ($X^2 = 2.8864$, df = 2, p-value = 0.2362).

4.1.3. Participation in Informer Networks under the BAU Scenario

Under the BAU scenario, there was little difference in the number of respondents who would be likely to inform (46%) and unlikely to inform (42%) if they saw or heard about someone committing a wildlife crime, with 12% unsure. However, there was a significant difference between the responses between the two conservation areas, with 52% of respondents being unlikely to inform under the BAU scenario at MFCA compared to 30% of respondents at QECA (Figure 4.2). At QECA, 61% of respondents were likely to inform under the BAU scenario, compared to 33% at MFCA. ($X$-squared = 8.95, df = 2, p-value = 0.011).
4.2. Predicted Behavioural Responses to Future Conservation Scenarios

4.2.1. Labour Allocation Change

A cumulative link mixed model (CLMM) was used to estimate the influence of the different scenarios and household socio demographic factors on change in household labour allocation to specified livelihoods, compared to the BAU allocation. When compared to the models baseline conditions (withdrawal of all access scenario, site-MFCA, occupation-farmer), all of the four other scenarios had a positive parameter estimate (Table 4.1). This indicates that these scenarios are more likely to result in an increase or no change in labour allocation from the BAU and are less likely to result in a decrease compared to the withdrawal of all access scenario. The Revenue Sharing to HWC, Wildlife Friendly Enterprise Scheme and Eco-guard scenarios all had parameter estimates of approximately equal magnitude, indicating that they are similarly likely to be associated with a high probability of an increase response.

Threshold coefficients indicate the values of the coefficients at which the probable outcome switches between different levels of labour allocation change. For example, WFES has an estimate of 5.8 (above the threshold value of 4.06) indicating a high...
probability of an increase in labour allocation under this scenario compared to the baseline conditions.

Conversely, the parameter estimate for the Sustainable Hunting scenario is much lower, which indicates that under this scenario, individuals would have a lower probability of a no change or increase response. The parameter estimate indicates under the sustainable hunting scenario, people’s labour allocation would not differ significantly from withdrawing all access and because the parameter estimate does not significantly differ from zero, there is no evidence that there would be any change in labour allocation compared to the BAU scenario.

The final model indicated that conservation area (site) and occupation were the only two variables which affected people’s decisions with regards to labour allocation. Neither age, gender, poverty score nor interview order had any significant influence on labour allocation and hence were dropped from the model. District did not have an influence on decisions so this was removed from the model as a random effect.

CLMM one: \( \text{Labour allocation} \sim \text{scenario} \times \text{site} + \text{occupation} + (1 \mid \text{individual}) \)

Table 4.1. Coefficient table for CLMM one; fitted with the Laplace approximation; negative values indicate the likelihood of a decrease or no change, positive values indicate the likelihood of a no change or increase compared to baseline conditions.

| Parameter                              | Estimate | Std.Error | Pr(>|z|) |
|----------------------------------------|----------|-----------|---------|
| Eco-guards                             | 5.7517   | 0.5790    | < 2e-16 *** |
| Revenue Sharing to HWC                 | 5.2181   | 0.5548    | < 2e-16 *** |
| Sustainable Hunting                     | 0.5188   | 0.4308    | 0.228458 |
| Wildlife Friendly Enterprise Scheme     | 5.8053   | 0.5813    | < 2e-16 *** |
| Site “QECA”                            | 0.6418   | 0.4682    | 0.170486 |
| Occupation “Other”                      | -1.1345  | 0.327     | 0.000525 *** |
| Eco-guards: QECA                        | -2.3933  | 0.6347    | 0.000163 *** |
| Revenue Sharing: QECA                   | -0.9714  | 0.6131    | 0.113114 |
| Sustainable Hunting: QECA               | 0.3540   | 0.6399    | 0.580151 |
| WFES: QECA                             | -1.2542  | 0.6373    | 0.049080 * |

\textit{Significance codes:} 0 : *** 0.001 : ** 0.01 : * 0.05 : . 0.1 : \text{ 1}

Threshold values: 0|1 (-1.2195) 1|2 (4.0614)
When looking at differences in responses at the two different sites, a significant interaction with scenario was included in the selected model. Compared to respondents at MFCA, respondents at QECA were significantly less likely to increase their labour allocation and more likely to not change, or decrease their labour allocation under all scenarios (Table 4.1). In particular, the low negative estimate for the interaction between the site and the Eco-guard scenario indicates that respondents at QECA are considerably more likely to decrease or not change their labour allocation under that scenario compared to respondents at MFCA. The parameter estimate for occupation “other” (Table 4.1) also indicates that non-farmers were significantly more likely to give ‘no change’ responses compared to the baseline model. This means that occupation had a significant effect, with non-farmers (fishermen, small business owners or casual labourers) being less likely to increase their labour allocation to their main livelihood activities compared to farmers. For example, for a farmer at MFCA, the mean estimated probability of an increase in household labour allocation under the eco-guard scenario is 0.84. In comparison, for a farmer at QECA, the mean estimated probability of an increase in household labour allocation under the same scenario is 0.48 (Figure 4.3).

*Figure 4.3. Probability of labour allocation changes under future scenarios; mean probabilities dependent upon site and occupation*
For a full summary of the mean estimated probabilities for a household’s likely labour allocation under different conditions please see Appendix II.

4.2.2. Likelihood of Participation in Informer Networks

A second CLMM was used to estimate the influence of different scenarios and household socio demographic factors on a respondent’s likelihood to participate in informer networks. When compared to the models baseline conditions (Withdrawal of All Access), all of the four other scenarios had a positive parameter estimate (Table 4.2). This indicates that these scenarios are more likely to result in an increase or no change in a respondent’s likelihood to inform on wildlife crime compared to the baseline. Demographic factors such as age, gender, poverty score and occupation had no influence on results, but site was retained in the final model.

CLMM two: Likelihood to inform ~ scenario + site + (1 | individual)

Table 4.2. Coefficient table for CLMM two, fitted with the Laplace approximation; negative values indicate the likelihood of a decrease or no change, positive values indicate the likelihood of no change or increase compared to baseline conditions.

| Parameter                                  | Estimate | Std.Error | Pr(>|z|)       |
|--------------------------------------------|----------|-----------|----------------|
| Eco- guards                                | 2.6288   | 0.3722    | 1.63e-12 ***   |
| Revenue Sharing to HWC                     | 3.4996   | 0.4068    | < 2e-16 ***    |
| Sustainable Hunting                         | 1.5821   | 0.3409    | 3.47e-06 ***   |
| Wildlife Friendly Enterprise Scheme         | 3.6900   | 0.4154    | < 2e-16 ***    |
| Site “QECA”                                 | -0.9318  | 0.4556    | 0.0408 *       |

Significance codes: 0 **** 0.001 *** 0.01 ** 0.05 * 0.1 ’ 1
Threshold values: 0|1 –(3.8099) 1|2 (1.9319)

The WFES scenario produced the highest mean probability for an individual to increase their probability to inform, ranging from 0.69 probability of an increase at QECA, to 0.85 probability of an increase at MFCA. The negative parameter estimate for QECA indicates that, compared to respondents at MFCA, respondents at QECA were less likely to increase their probability of informing on wildlife crime, and on the whole, are more likely to not change their likelihood of informing. This could be due to the fact that under the baseline, 61% of respondents at QECA reported that they are likely to inform compared to 33% of respondents at MFCA, so the possibility for an increase to occur was higher for respondents at MFCA.
Notable differences between respondents at the two sites are seen under the Sustainable Hunting and Eco-guards scenarios; the mean estimated probability of an individual increasing their probability of informing at MFCA under the Sustainable Hunting scenario is 0.41, conversely, the probability of an individual at QECA increasing their probability is 0.21. Similarly, under the Eco-guards scenario, the mean estimated probability for an individual increasing their probability of informing at MFCA is 0.66, for an individual at QECA, the mean probability is 0.44.

Withdrawal of All Access performed worst out of any scenario, with 62% of respondents stating there would be no change in their likelihood to inform (no significant difference compared to BAU; X-squared = 2.1572, df = 4, p-value = 0.70) and 15% stating that they would be less likely to inform. Respondents noted how, if they perceived the conservation area to be helping them, they would be more willing to help the park authorities and would be more likely to inform on wildlife crime relative to the baseline scenario. With regards to informing under the Wildlife Friendly Enterprise Scheme, one respondent noted:

“I would be more likely to inform under this scheme as we would be benefiting and if someone was entering the park illegally they could put the scheme at risk so I’d inform, why should someone go to the park if the park is helping us?”
For other respondents who were unlikely to change their behaviour, the logistical difficulties in informing were noted, with respondents stating that i) they never see people committing wildlife crimes and ii) even if they did, they wouldn’t know who to report the crime to, with park authority staff often located long distances away.

An additional question was asked to investigate the likelihood of respondents using an anonymous text scheme to report on wildlife crime in return for a financial reward. When compared to the business as usual results for people’s likelihood to inform on wildlife crime, a 78% increase in respondent’s likelihood to inform was seen. This was not dependent upon the size of the financial reward, with respondent indicating they would inform for either. However, the majority of respondents noted how, although they would be more likely to inform by an anonymous text as it was logistically easier, they would only inform if they were on good terms with the park. For example, when compared to informing responses under the Eco-guard scheme, only 28% of respondents were more likely to inform by text, indicating that participation in informer networks is highly dependent upon the people-park relationship, regardless of the reward offered.

4.3. The Equity of Future Policy Options

4.3.1. Park Fairness

A third CLMM was used to investigate the influence of different scenarios and household socio demographic factors on fairness rating scores (Table 4.3). When compared to the Withdrawal of all Access scenario, the Wildlife Friendly Enterprise Scheme, Revenue Sharing to HWC and Eco-guard scenarios all had high parameter estimates, indicating that these three scenarios are likely to result in either ‘very fair’ or ‘fair’ responses. The magnitude of each of these three parameter estimates varies however, indicating that the Wildlife Friendly Enterprise Scheme has the highest probability of a high fairness rating due to the high parameter estimate. In contrast, the lower parameter estimate for Sustainable Hunting indicates that under this scenario, people were significantly more likely to perceive the scheme as unfair compared to the models baseline conditions (Table 4.3). Age, gender, poverty score and occupation did not significantly influence fairness scores but whether or not a
respondent was an Authorised Resource User did have an influence, both on its own and when combined with scenario.

**CLMM three: fairness ~ scenario * ARU + (1 | individual)**

Table 4.3. Coefficient table for CLMM three, fitted with the Laplace approximation; parameter estimates above -0.02 indicate positive fairness ratings, estimates below -0.20 indicate low fairness ratings compared to baseline conditions.

| Parameter                   | Estimate | Std.Error | Pr(|z|)    |
|-----------------------------|----------|-----------|-----------|
| Eco- guards                 | 1.9623   | 0.3003    | 6.42e-11 *** |
| Revenue Sharing to HWC      | 2.5297   | 0.3156    | 1.11e-15 *** |
| Sustainable Hunting         | -0.6604  | 0.2826    | 0.019462 *  |
| Wildlife Friendly Enterprise Scheme | 3.5083 | 0.3548    | < 2e-16 *** |
| ARU = “Yes”                 | -2.5105  | 0.5109    | 8.92e-07 *** |
| Eco-guards: ARU             | 2.6205   | 0.6509    | 5.68e-05 *** |
| Revenue Sharing: ARU        | 2.6260   | 0.6699    | 8.85e-05 *** |
| Sustainable Hunting: ARU    | 2.7218   | 0.6400    | 2.11e-05 *** |
| WFES: ARU                   | 2.6142   | 0.7290    | 0.000336 *** |

Significance codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Threshold Coefficients: -2 |-1 (-1.18128) -1 | 0 (-0.20461) 0 |1 ( -0.02365) 1 | 2 (2.27282)

Authorised Resource Users (ARUs) are members of the community who have a signed agreement with park authorities that entitles them to access resources (such as firewood or grass) on a regulated basis. The negative parameter estimate for an ARU indicates that ARU’s were significantly more likely to feel that the model’s baseline conditions (withdrawal of all access) was “very unfair”. The positive interaction between ARU and scenario for all of the other scenarios shows that ARUs are much more likely to perceive the scenario as “very fair” compared to the baseline. This is illustrated in Figure 4.5.
Figure 4.5. Probability of fairness ratings under future scenarios; comparisons between ARUs and NARUs.

For ARUs, who currently have access to resources, the withdrawal of all access scenario was understandably disliked. One respondent stated:

“If they do this it means there is no proper relationship between the community and the park – we would no longer be neighbours as we would be suffering strongly. It would not be fair. We would have to increase our time looking for resources as they are being depleted so we would have to reduce our time farming which will impact us. Telling the park about people hunting would be difficult as there is no longer a relationship so why should I help them”. ARU, MFCA.

4.3.2. Tackling Perceived Injustice through Increased Resource Access

The high probability of negative responses for the Withdrawal of All Access scenario by ARUs was to be expected, but perhaps a more interesting result is seen when looking at the negative parameter estimate for Sustainable Hunting, which had a high predicted probability of an ‘unfair response’. People perceived this policy to be unfair, particularly for future generations, with the belief that people would not stick to the rules and regulations of the policy. One respondent stated:

“It will cause more damage as people will become increasingly interested. People will say ‘ah, they allowed us to kill this last time on the hunting day last time – let’s go again’! It will put it in people’s minds that it is ok to hunt so more people will go illegally…would be of no benefit and would not be fair as children might not be able
to see things in the future. If something is introduced that’s never been allowed it will stimulate interest and more people will start hunting which could cause suffering here”

Others attributed the fact that this scheme would not be addressing their main problem, human wildlife conflict, as the primary reason as to why they perceived this as an unfair policy:

“If they allowed us to hunt we would get back here and then what? The animals would still be here destroying our crops so I’d still be suffering here living next to the park…it is not tackling our real problem we face. The meat you would hunt cannot be stored, at least with my farming I can store the food, the park should be doing something to help with our farming”

The mean estimated probability of an individual giving a ‘very unfair’ response to this scenario ranged from 0.32 to 0.37, depending on whether or not the respondent was an ARU. Overall, 66% of respondents reported the Sustainable Hunting scenario to be either unfair or very unfair and 25% of respondents rated it worse than the baseline.

4.2.6. Tackling Perceived Injustice; Reshaping the Revenue Sharing Programme

When asked if money from the revenue sharing funds should be diverted from development projects to be spent on HWC mitigation, the results reflected the reported feelings of perceived injustice seen through the fairness scores, with 76% of respondents stating that they would prefer 50% of revenue sharing fees to be spent on HWC mitigation (compared to zero or 25%).

One respondent stated:

“I would prefer the 50% as it would be fairer and will help reduce crop raiding. There was once a trench which initially helped but died due to poor maintenance so elephants began crossing again. If these things were maintained it would help”

The most frequent reason for this response was due to the view that the larger amount of money would do more to protect crops. For respondents, it was not a case of ‘removing funds from development projects’. Respondents reported how, if the crop raiding could be stopped, development could take place naturally; children
would no longer have to guard crops, there would be money for school fees and savings groups could be set up to implement projects through the joint effort of village households. When questioned on whether it mattered that there would be less money available for projects such as schools, one respondent stated:

“Would prefer the 50% as this would be treating people equally. Crops are just as important as people lack school fees even though we have schools so crops are important to protect to give people an income”.

For the villages who had received revenue sharing money, respondents also reported how by giving money to human wildlife conflict mitigation measures, it would benefit everyone in the community, as opposed to the few people who benefit from handouts such as goats.

4.3.3. Park Impact

When comparing the impact of the park under each scenario against the baseline, Figure 4.6. illustrates how peoples responses either i) improved compared to the baseline (positively impacted by the scenario) ii) did not change or iii) worsened compared to the baseline (negatively impacted by the scenario). The majority of respondents reported that under the Withdrawal of All Access and Sustainable Hunting scenarios, there would be no changes in the parks impact upon their lives, and under the Withdrawal of all Access scenario, 15% of respondents reported that the parks impact would be worse than business as usual, this was also the case for 6% of respondents under the Sustainable Hunting scenario.
Figure 4.6. Perceived impacts of the park under future scenarios comparative to business as usual scenario

Under the Wildlife Friendly Enterprise Scheme, Revenue Sharing to HWC and Eco-guards scenarios, the perceived future impact of the park on respondents was positive, with all three scenarios resulting in improvements compared to the baseline. The negative impact of withdrawing all access to resources could be argued to be expected but the high percentage (64%) of people indicating a negative impact under the Sustainable Hunting scenario is perhaps more surprising and is similar to the results seen by the fairness ratings.
5. Discussion

5.1 Understanding and Predicting Attitudinal and Behavioural Responses to Conservation Interventions

Interventions targeting the human use of natural resources, often work to alter the incentives that natural resource users face, with the ultimate aim of altering their decisions about resource use. It is vital however to understand what incentives might drive changes in human behaviour and why, as failing to understand socio-ecological systems, and their often heterogeneous dynamics, can result in misleading predictions about the impacts of conservation policies; with the resulting outcomes often unintended and destined to be unsuccessful (St John, Edwards-Jones & Jones, 2011; Damania, Milner-Gulland & Crookes, 2005).

5.2 Policy Effectiveness

Table 5.1 shows a summary of how each policy intervention performed in response to each of the four study parameters, with arrows indicating the modal change compared to the Business As Usual (BAU) scenario (i.e. indicating an improvement, no change or worsening of each parameter compared to the BAU).

Table 5.1. Policy Performance across Multiple Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour allocation to main livelihood activity</td>
<td>↑</td>
<td>→</td>
<td>→</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Participation in informer networks</td>
<td>↑</td>
<td>→</td>
<td>→</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Fairness perception</td>
<td>↑</td>
<td>→</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Impact perception</td>
<td>↑</td>
<td>→</td>
<td>→</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Legend

- Improvement ↑
- No Change →
- Decrease ↓

The Wildlife Friendly Enterprise Scheme (WFES), Revenue Sharing to HWC (RS to HWC) and Eco-guard scenarios all performed well, with improvements for all four questions. Sustainable Hunting and Withdrawal of All Access (WOAA) performed
poorly at both parks with modal responses for each scenario indicating that under these policies there would be no changes compared to the BAU. The only exception was the fairness parameter under the WOAA scenario, which indicated a worsening in fairness. There was a general consensus at both parks that both WOAA and Sustainable Hunting were unfair and unhelpful policies which did not tackle the fundamental problems that people living around the two conservation areas face.

The difference in responses between sites, with QECA being generally less likely to change behaviours than respondents at MFCA, suggests that policies may need to be tailored to individual sites, rather than being applied in a blanket manner. Understanding the reasons behind these differences is not entirely clear as attitudes towards the future scenarios, illustrated through fairness and impact ratings, did not significantly differ between conservation areas. Under the BAU scenario, there were fewer respondents at QECA who felt they were negatively impacted by the protected area or would change their labour allocation if the current situation continued. This could perhaps indicate that the current costs of living next to a protected area are more severe for respondents at MFCA, or that interventions are performing better at QECA. The reasons behind this may not necessarily reflect differences in the management of the two protected areas however. For example, the insecurity experienced in the northern region of Uganda over the past 25 years has undermined the productive sector in the region (NDP, 2010) which could potentially amplify any negative impacts felt by the park to a greater extent at MFCA due to fewer income earning opportunities and potentially lower levels of adaptive capacity to respond to shocks such as crop raiding events. Poverty levels for the West-Nile region in which some MFCA districts are situated are estimated at 40%, compared to 25% in the mid-Western sub region in which QECA is situated (UBOS, 2010).

Heinen (1996) suggests that the specific domesticated landscape around a protected area should be a central consideration when designing conservation interventions to account for differences in population densities, economic heterogeneity and economic disparity. In addition to accounting for socio-demographic factors, situation specific problems faced by people living around different conservation areas in Uganda should also be considered. For example, areas that suffer from a particularly high occurrence of human wildlife conflict, or varying forms of human wildlife conflict, may require different interventions. Several
“small” people–park management strategies may therefore be more appropriate than a “single large” people–park strategy applied across an entire protected area (Mackenzie, Baird & Hartter, 2014).

Neither age, gender, nor poverty score had an influence on any of the results. This is contrary to other studies from the field of agricultural economics, which have found that variables such as gender and education can have a quantifiable effect on labour decisions and can significantly influence a household’s decision to diversify to other activities (Matshe & Young, 2004). Occupation however was found to be a significant predictor of behaviour with regards to a person’s propensity to increase their labour allocation to their livelihood under differing scenarios, with farmers being more likely than non-farmers to increase their household labour allocation. This is not a surprising result as three out of the five policies (Revenue Sharing to HWC, WFES and Eco-guards) targeted agricultural improvements through reducing human wildlife conflict, or in the case of WFES, by providing a stable market for crops that do not attract problem animals. For many of the non-farmers, despite the lower probability of a change in behaviour, many still indicated support for the schemes, believing them to be fair policies which could have a positive impact for them. This was particularly true for small business owners, many of whom believed that by reducing human wildlife conflict and subsequently raising household incomes, a knock on effect would eventually been seen at the village level.

One respondent stated:

“This would really benefit me as if the project stops animals from destroying crops there would be food in abundance for the community. And if crops increase, money increases, people spend more on my business”

All three successful scenarios tackle economic poverty and human wildlife conflict which relates back to the subsistence, commercial and perceived injustice drivers of wildlife crime. Interestingly, sustainable hunting performed poorly, despite evidence that bushmeat is widely hunted at both parks (Travers et al, in prep). This could indicate that the cultural and traditional uses of bushmeat might not be as apparent as first thought, and might not play a significant role in driving wildlife crime within the study areas. Another possible explanation for the lack of support for sustainable hunting could also be due to the fact that the scenario was framed around hunting for
subsistence and home consumption only, not for sale. Travers et al (in prep) found that people at MFCA and QECA primarily hunt for commercial purposes so sustainable hunting would not address this driver.

5.3 Lessons Learnt

5.3.1 The Perceived Injustice of Human Wildlife Conflict

Removing half of the revenue sharing funds to spend on human wildlife conflict, rather than on development projects was received well by the majority of respondents. It has been shown that expenditure on development for conservation purposes does not necessarily give results that are effective in conservation terms (Adams & Thomas, 1996) and evidence from Lake Mburu park in Uganda showed that development style benefits can initially boost support, but this effect does not necessarily persist (Infield & Namara, 2001). In contrast, a single event, such as a crop raid can result in long lasting resentment towards protect areas (Naughton-Treves, Holland & Brandon, 2005). Evidence for this was seen throughout this study with respondents indicating that human conflict was for many, a higher priority than development projects.

One respondent noted:

“If crops are protected it can aid our development. In fact, it is more important than development projects as with the money from crops I can do many things and it helps us develop as you can send children to good schools. If instead you have schools but no money to send your kids there what is the point in that? Having development structures but being too poor to access them is no good for us”.

Responses gathered from this research indicate that respondents perceive economic poverty and human wildlife conflict to be highly interlinked. Human wildlife conflict was repeatedly reported at both conservation areas to be the main impact caused by the park, with crop losses being the primary problem. Issues of personal safety were also reported with evidence of people being injured by buffalo and elephants. Furthermore, when asking respondents why they perceived the baseline scenario to be unfair, human wildlife conflict was the primary reason. Responses focussed on
the inequality of the situation, whereby animals can come and destroy village property, yet no compensation or help is given.

Many respondents reported on the high fertility of the soils surrounding the protected areas and attributed crop raiding as the main limiting factor to successful crop production, which they blamed for entrapping them in a cycle of poverty. It was noted by respondents that budgets are planned for the year, based around specific crops, so when they are destroyed by wild animals, people lack the capacity to put their plans into action and, as many phrased it, ‘we are back to square one’. When crops are lost, people not only lose their food source, but they also lose their source of income from which to replace the losses (Harrison, 2013). Furthermore, human wildlife conflict not only has the potential to reduce financial capital, but can also result in high opportunity costs (Thirgood., et al 2005; Hoare, 1999). Evidence of children staying home and even being employed to guard crops during the day, with household heads guarding crops during the night, was seen during this study (pers obs; Figure 5.1).

Elsewhere in Africa, high perceptions of species that cause risk are correlated with high poaching risk. For example Kahler and Gore (2015) illustrated how buffalo poaching was driven by both the fear of attack or injury and to prevent crop damage. However, conflict between humans and wildlife can arise due to the perceived risk, just as much as from the actual damage and attitudes may be shaped dependent upon the response of the local authority as much as the actual damage caused (Hiser, 2012; Ajzen, Brown & Carvajal, 2004). Local people who live alongside wildlife commonly perceive wildlife to be the property of the state. This results in the institutions responsible for managing protected areas being blamed for economic losses due to crop raiding species (Osborne and Hill 2005) and creates significant feelings of perceived injustice towards protected areas; illustrated in this study by the low fairness ratings seen in the baseline scenario and qualitative evidence throughout.
Evidence has shown that investing in improving incomes through livelihood improvements can be an effective approach to tackling wildlife crime (Kumpel et al 2010; Van Vliet & Nasi, 2008; Loibooki et al., 2002; Barrett and Arcese, 1998). Travers et al (in prep) found a similar situation in Uganda. Hunting at MFCA and QECA was highest during periods of agricultural inactivity, hence, interventions that have the ability to increase household labour allocation could be an effective ICDP approach. The Wildlife Friendly Enterprise Scheme, Revenue Sharing to HWC and Eco-guards scenarios all resulted in a high probability of increasing household labour allocation to livelihood activities. For farmers, who made up 83% of respondents, these schemes were seen as a way to increase productivity and grow a wider variety of crops that currently are not viable due to crop raiding or the absence of markets. Many respondents noted how they expected an increase in income due to increased productivity if crops could be grown without problem animals destroying them and noted how they would reinvest the money from farming into land expansion and
equipment enhancements. By creating the right incentives and conditions for people to be able to farm to their full extent, i.e. by reducing crop raiding occurrences and providing access to markets, people will increase their labour allocation accordingly. This is seen throughout the field of economics where labour is allocated to the activities that will be most profitable. Moro et al (2013) found improved access to markets or microcredit could reduce illegal hunting, with no decrease in well-being (utility) levels if these changes in livelihood sources took place. In Zambia, conservation efforts that built strong linkages between agriculture and rural markets resulted in land use practices conducive to improved natural resource management and successfully reduced the number of snares in the area (Lewis et al., 2011). An enterprise scheme in Cambodia has also had similar success through an agri-environment payment scheme which offered a price premium to rice farmers who kept to land use plans and followed no hunting rules (Clements et al., 2010).

With regards to the potential of such a scheme to reduce wildlife crime across the two protected areas, Travers et al (in prep) found that the percentage of people engaging in wildlife crime is around 40% across the two conservation areas. The probability that hunting households were included in this study is therefore substantial. It is acknowledged however that this approach needs to be treated with caution as increased income per capita associated with income development can have unintended consequences and can result in an increased demand for wildlife products among poor populations (Barrett and Arcese 1995; Salafsky 1994). In a bio-economic model, Damania et al (2005) also illustrated how, despite an increase in time spent on agriculture compared to hunting due to improved agricultural yields, hunting did not stop altogether and instead, people invested in gun hunting rather than snaring. However, the social norms associated with the Sustainable Hunting scenario were largely negative indicating that despite the relatively high levels of illegal hunting at the two parks (Travers et al in prep), around half of all respondents believed that hunting within the park is damaging and dangerous.

It is clear from the responses given that livelihoods are intrinsically linked to agriculture, with people’s perceptions of development repeatedly centred on agricultural improvements. For both MFCA and QECA, agricultural improvements that could provide the opportunity for households to farm more productively
throughout the year are needed if wildlife crime occurrences are to be reduced. This could be done by reducing the occurrence of crop raiding and providing markets for alternative crop varieties. Further investigation is needed into the types of crops that could allow this. This however could require the provision of market access to allow people to sell certain crops.

5.3.3 Could a Managed Wildlife Harvest Scheme Work at MFCA or QECA?

Barrett and Arcese (1998) note how durable goodwill and cooperative behaviour among communities surrounding protected areas are built largely by attention to the fundamental economic challenges they face, rather than interventions such as resource harvesting. When looking at the responses to sustainable hunting, people repeatedly commented on how this policy would not help them, how it would not tackle the real issues they face; instead it would just be an added benefit which would be irrelevant if they remain suffering due to crop raiding.

One respondent noted:

“It is useless, wouldn’t help us at all. If it is regulated and we are only allowed a certain amount, what use is that to us? It is unfair as when you compare crop damages to the small benefit we might get from the meat it doesn’t compare, the crop damages can see you back for one year; this might benefit us for just one day. Our costs would far outweigh the benefits. It could also be bad for the park. What I dig today will help us for the future – the meat from the park will help us for just that evening.”

Furthermore, many respondents reported on how legal access could increase demand and stimulate further illegal access. There is also evidence from elsewhere in Uganda that resource access can increase demand rather than reducing it by providing a legal means of doing so. For example, the negotiation of a MoU for communities to fish on Lake Mburo stimulated demands for access to other small lakes within the park, areas which were designated for conservation purposes. Making the lake available for fishing did not reduce demand as intended and may have even encouraged communities to think in production terms, discounting the park’s conservation objectives (Infield & Namara, 2001).
5.4 Conservation and Management Lessons

Many ICDP approaches aim to offer benefits to local communities in the form of regulated resource use or development projects. This is thought to build strong relations and encourage support for conservation. However, elsewhere evidence suggests that the existence of fundamental and unresolved conflicts make it difficult to improve relations between the park and community, despite implementation of programmes aimed at doing so (Scott, 1998). In Namibia, Kahler and Gore (2015) illustrated how despite buffaloes contributing to the local economy via trophy hunting revenues, tolerance and attitudes towards the species was still extremely low due to human wildlife conflict.

This study suggests that unless the costs of the protected areas are tackled, the benefits that people receive from ICDPs are unlikely to be effective at incentivising pro-conservation behaviour. Successful interventions to engage communities surrounding MFCA and QECA should target human wildlife conflict and agricultural improvements. Benefits, such as sustainable hunting schemes which attempt to build people-park relations and promote pro-conservation behaviours are of limited impact when these problems fail to be addressed. From responses gathered from the baseline, it appears that some farmers respond to crop damage in a similar way to climatic or epidemiological shocks that depress farm labour productivity; with many respondents stating that if the current situation continues, their time spent farming will reduce as the risks due to crop damage are too great (Fafchamps, 1993).

Human wildlife conflict not only has the potential to drive wildlife crime due to the perceived injustice, but also has the potential to reduce household livelihood activities. This can result in economic implications and the need to find an income elsewhere; having the potential to increase a household’s likelihood of engaging in wildlife crime.

5.5 Future Management Priorities

A promising approach for MFCA and QECA could combine improvements in agricultural productivity and a reduction in HWC; both of which have the ability to be introduced simultaneously through a Wildlife Friendly Enterprise Scheme focussed on crops that deter problem animals.
This type of scheme has worked elsewhere. For example, Elephant Pepper ensured production of the raw materials necessary to repel elephants from local farms and created two market opportunities: i) large scale planting of chillies for Tabasco sauce purchased by a large international market buyer and ii) the development of sauces and spice grinders carrying the Elephant Pepper brand and Certified Wildlife Friendly™, thus linking the products directly to efforts to reduce human wildlife conflict and ensuring the protection of elephant populations (USAID, 2015).

Another positively received suggestion was that 50% of the revenue sharing funds are diverted to human wildlife conflict mitigation measures. The current perception of the inequality of the revenue-sharing process gives a strong incentive for the process to be revised. Further work should be carried out to understand i) which mitigation measures have proved most effective ii) what approaches would work for the specific conservation areas (MFCA showed strong support for Eco guards compared to QECA – are there any underlying justifications for this?) and iii) the scale at which this should be implemented. For example, a unified approach at the district level could be more effective to allow for large scale interventions to be implemented compared to small projects at the village level which, due to the limited funds available for village level projects, are often of limited use (pers obs).

This study illustrates that by tackling economic poverty and perceived injustice through reducing human wildlife conflict and facilitating agricultural improvements, people and park relations could be improved and the probability of engagement in wildlife crime could be reduced. Attitudes at MFCA and QECA are driven by the costs of conservation, despite the benefits conservation interventions might provide. Future conservation policies should therefore concentrate on tackling the fundamental issues communities face, rather than attempting to provide additional benefits which are irrelevant all the while people remain suffering from protected areas.
References


Duffy, R. & St John, F. (2013) Poverty, Poaching and Trafficking: What are the links? 


R Core Team. (2015) *A language and environment for statistical computing* Vienna, Austria, .


UWA. (2009) Memorandum of Understanding (MoU) between Uganda Wildlife Authority represented by Queen Elizabeth Protected Area (QEPA) and Katunguru women in L.Katwe S/C and Katunguru S/C in Kasese and Bushenyi districts respectively: Agreement for regulated papyrus use.


## Appendix I Summary of the Drivers of Wildlife Crime in Uganda

<table>
<thead>
<tr>
<th>Driver</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To meet basic needs (subsistence)</strong></td>
<td>Subsistence driven crime can be caused by a lack of basic necessities or the means to obtain them. Resources such as bushmeat fish, firewood, honey and timber (Twinamatsiko et al., 2014; Kabagumya, 2001) may be used directly or sold in order to obtain basic necessities.</td>
</tr>
<tr>
<td><strong>Commercial wildlife crime</strong></td>
<td>Commercial wildlife crime is driven by a desire to &quot;attain wealth above and beyond basic necessities&quot; (Moreto, 2013). Examples includes creating charcoal, cutting timber, hunting bushmeat and poaching elephant ivory for national and inter-national trade.</td>
</tr>
<tr>
<td><strong>Perceived Injustice</strong></td>
<td>The lack of response to problem animals or compensation is perceived to be unfair and the distribution of benefits relating to conservation is also an issue (Twinamatsiko et al., 2014). For example, revenue sharing and regulated resource access are perceived to be inequitably shared, with benefits reaching the local elite rather than the people who suffer the greatest costs from wild animals.</td>
</tr>
<tr>
<td><strong>Culture and traditions</strong></td>
<td>Medicinal plants have historically been used to treat illnesses across Uganda, and many can no longer be found outside protected areas (Eilu et al., 2007; Ssegawa and Kasenene 2007). Additionally, for some, the killing and eating of bushmeat is seen as a cultural activity and is associated with becoming a man and appeasing ancestors (Moreto 2013; Kairu 2005; Kabagumya, 2001; Twinamatsiko et al., 2014)</td>
</tr>
<tr>
<td><strong>Political Influence</strong></td>
<td>Politicians, attempting to gain votes, have told people that PAs are rightfully theirs, leading to encroachment at Mount Elgon, QECA and MFCA, and widespread clearing of forest reserves for agriculture (Harrison et al., 2015).</td>
</tr>
</tbody>
</table>
**Appendix II** Cumulative Link Mixed Models: Mean Estimated Probabilities

**Table one:** Cumulative Link Mixed Model (CLMM) fitted with the Laplace approximation for CLMM one.

Mean estimated probabilities for changes in household labour allocation for a respondent dependent upon conservation area and occupation.

### Farmer at MFCA

<table>
<thead>
<tr>
<th></th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decrease</strong></td>
<td>0.001597569</td>
<td>0.14952016</td>
<td>0.228018692</td>
<td>0.000888669</td>
<td>0.000937643</td>
</tr>
<tr>
<td><strong>No Change</strong></td>
<td>0.237668828</td>
<td>0.822355651</td>
<td>0.755048671</td>
<td>0.147925796</td>
<td>0.154807162</td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>0.760733602</td>
<td>0.02812419</td>
<td>0.016932637</td>
<td>0.851185535</td>
<td>0.844255195</td>
</tr>
</tbody>
</table>

### Farmer at QECA

<table>
<thead>
<tr>
<th></th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decrease</strong></td>
<td>0.002219891</td>
<td>0.060990567</td>
<td>0.134549797</td>
<td>0.001638304</td>
<td>0.005379792</td>
</tr>
<tr>
<td><strong>No Change</strong></td>
<td>0.302037143</td>
<td>0.866371793</td>
<td>0.833763298</td>
<td>0.242248521</td>
<td>0.509929446</td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>0.695742966</td>
<td>0.072637641</td>
<td>0.031686905</td>
<td>0.756113176</td>
<td>0.484690763</td>
</tr>
</tbody>
</table>

### Non Farmer at MFCA

<table>
<thead>
<tr>
<th></th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decrease</strong></td>
<td>0.004951111</td>
<td>0.35345737</td>
<td>0.478752928</td>
<td>0.00275823</td>
<td>0.002909935</td>
</tr>
<tr>
<td><strong>No Change</strong></td>
<td>0.489496007</td>
<td>0.63732239</td>
<td>0.515738511</td>
<td>0.349429504</td>
<td>0.361623134</td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>0.505528282</td>
<td>0.00922024</td>
<td>0.005508562</td>
<td>0.647812266</td>
<td>0.635466931</td>
</tr>
</tbody>
</table>

### Non Farmer at QECA

<table>
<thead>
<tr>
<th></th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decrease</strong></td>
<td>0.006870799</td>
<td>0.168035698</td>
<td>0.325892451</td>
<td>0.005076918</td>
<td>0.016541255</td>
</tr>
<tr>
<td><strong>No Change</strong></td>
<td>0.569376243</td>
<td>0.807394354</td>
<td>0.663693648</td>
<td>0.495674692</td>
<td>0.751226494</td>
</tr>
<tr>
<td><strong>Increase</strong></td>
<td>0.423752966</td>
<td>0.024569949</td>
<td>0.010413901</td>
<td>0.49924839</td>
<td>0.232232251</td>
</tr>
</tbody>
</table>
**Table two:** Cumulative Link Mixed Model (CLMM) fitted with the Laplace approximation for CLMM two. Mean estimated probabilities for changes in a respondent’s likelihood to inform on wildlife crime dependent upon conservation area.

<table>
<thead>
<tr>
<th>MFCA</th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease</td>
<td>0.000668721</td>
<td>0.004532138</td>
<td>0.021670527</td>
<td>0.000552826</td>
<td>0.001595933</td>
</tr>
<tr>
<td>No Change</td>
<td>0.171878183</td>
<td>0.58203029</td>
<td>0.851788859</td>
<td>0.146472714</td>
<td>0.330902218</td>
</tr>
<tr>
<td>Increase</td>
<td>0.827453097</td>
<td>0.413437572</td>
<td>0.126540615</td>
<td>0.852974461</td>
<td>0.66750185</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QECA</th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease</td>
<td>0.00169618</td>
<td>0.01142768</td>
<td>0.053246961</td>
<td>0.001402467</td>
<td>0.004042249</td>
</tr>
<tr>
<td>No Change</td>
<td>0.344480591</td>
<td>0.771288957</td>
<td>0.892775289</td>
<td>0.303019703</td>
<td>0.554411241</td>
</tr>
<tr>
<td>Increase</td>
<td>0.653823229</td>
<td>0.217283363</td>
<td>0.053977751</td>
<td>0.69557783</td>
<td>0.44154651</td>
</tr>
</tbody>
</table>

**Table 3.** Cumulative Link Mixed Model (CLMM) fitted with the Laplace approximation for CLMM three. Mean estimated probabilities for predicted fairness levels dependent on whether a respondent is an Authorised Resource User (ARU) or a Non Resource User (NRU).

<table>
<thead>
<tr>
<th>NRU</th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Unfair</td>
<td>0.023869580</td>
<td>0.372651536</td>
<td>0.234821408</td>
<td>0.009107276</td>
<td>0.041344918</td>
</tr>
<tr>
<td>Unfair</td>
<td>0.037109004</td>
<td>0.239369946</td>
<td>0.214204252</td>
<td>0.014718877</td>
<td>0.061417034</td>
</tr>
<tr>
<td>Neither fair nor unfair</td>
<td>0.011222815</td>
<td>0.042003213</td>
<td>0.045062460</td>
<td>0.004592023</td>
<td>0.017922492</td>
</tr>
<tr>
<td>Fair</td>
<td>0.363927558</td>
<td>0.295440923</td>
<td>0.412512527</td>
<td>0.196814480</td>
<td>0.456326208</td>
</tr>
<tr>
<td>Very Fair</td>
<td>0.563871043</td>
<td>0.050534382</td>
<td>0.093399173</td>
<td>0.77476344</td>
<td>0.422987347</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ARU</th>
<th>Revenue Sharing to HWC</th>
<th>Sustainable Hunting</th>
<th>WOAA</th>
<th>WFES</th>
<th>Eco-guards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Unfair</td>
<td>0.021321461</td>
<td>0.324728288</td>
<td>0.790716144</td>
<td>0.008217396</td>
<td>0.037199672</td>
</tr>
<tr>
<td>Unfair</td>
<td>0.033369507</td>
<td>0.236106194</td>
<td>0.118650278</td>
<td>0.013311931</td>
<td>0.055857082</td>
</tr>
<tr>
<td>Neither fair nor unfair</td>
<td>0.010145511</td>
<td>0.043966447</td>
<td>0.013850763</td>
<td>0.004161005</td>
<td>0.016438229</td>
</tr>
<tr>
<td>Fair</td>
<td>0.343128284</td>
<td>0.333510163</td>
<td>0.068484348</td>
<td>0.181900086</td>
<td>0.440477040</td>
</tr>
<tr>
<td>Very Fair</td>
<td>0.592035238</td>
<td>0.061688908</td>
<td>0.008298468</td>
<td>0.792349601</td>
<td>0.450027977</td>
</tr>
</tbody>
</table>
Appendix III - Interview Protocol and Scenario Based Interview

Interview Protocol

The aim of the scenario interviews is to collect data relating to the potential performance of future conservation policy options. We will be interviewing park adjacent households with the aim to understand how they might react to scenarios of future change and how this in turn could affect their tendency to partake in wildlife crime.

Local permission

It is important that local government officials have been consulted regarding the research and their permission obtained to work in each village. Ensure that a copy of the research approval issued by the Uganda National Council for Science and Technology is available if requested.

1.1 Sampling

69 households will be sampled from 23 selected villages surrounding MFNP. These households have been randomly selected from the database of participants who were previously sampled in the household survey and unmatched count technique research. We will be surveying three households per village.

There are 6 different scenarios which will be presented in different orders throughout the research to avoid bias in the questioning. Please see the ordering guidelines.

1.2 On the day

It is preferable that the interview be conducted in private so that participants may respond to questions freely. Remind the participant that the interview should take between 45 minutes and an hour and that they are free to stop the interview at any time should they wish. If at any time the participant becomes visibly uncomfortable with the line of questioning, ask them if they are happy to proceed and halt the interview if they are not. If the participant becomes openly hostile, halt the interview.

1.3 Ending the interview

At the end of each interview, the participant should be thanked for their time and given a bar of soap as a token of the research team’s appreciation.
Scenario- Based Interview

1. Introduction:

“Hello. I would like to invite you to participate in a research study being conducted by Imperial College London from England. I am a student interested in learning and understanding how changes in conservation policies around Murchison Falls/ Queen Elizabeth National Park could be aligned more with the needs of local people like you who live in parishes that neighbour the park. I am interested to talk to you in order to understand how these possible future conservation policies could affect you or change your current livelihood practices. This interview should take about an hour.”

Explanation of voluntary participation: “Do you have time to answer some questions? Your answers will be very useful in helping me to understand the best way in which the Ugandan Wildlife Authority could adapt their conservation policies to ensure that the interests of the local communities are taken into account. Your participation in this research study is entirely voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalised. The different conservation policies which I will ask you about are not things that UWA is necessarily considering for implementation at MFNP/QENP or elsewhere in Uganda, and although I will inform UWA of the general results of this study, there is no commitment by them or anyone else to implement any policies or policy changes which I suggest as a result of this work.”

Assurance of confidentiality: “Please note that I do not work for UWA, I am a student carrying out research to understand how improvements could be made to the current conservation policies. Anything that you tell us during this interview will remain confidential and we will not share the information that you give us with anyone outside of our project. We will not ask you to tell us anything that could get you into trouble.”

Who to question: “If you have any questions about the research study, please contact Lucy Archer, Plot 802, Kiwafu Road, Kasanga, P.O. Box 7487, Kampala.”

Study sponsors: “This research has been funded by the UK government and has been reviewed according to the Uganda National Council for Science and Technology procedures for research involving human subjects.”

Obtaining verbal consent: “Are you are happy with everything that we have explained to you and would like to participate in the study?”

[If participant indicates that they are happy to participate please proceed with the interview. If the participant indicates that they would not like to participate, thank them for their time and move on to the next household to be interviewed.]

2. The Scenarios:

[Before we begin with the scenarios, we need to ensure the respondent knows what we are asking them to do – i.e. what we mean by a ‘future scenario’.]

“In this interview I will present different possible future scenarios to you and I would like you to imagine how you and your household would respond to the changes in those scenarios. I would like you to think about the future and what you would do differently if things changed.
For example, how the change might affect your daily routine or your activities? Each scenario will cover a time period of five years.

For example, I might present you with a scenario whereby the price of meat, such as beef from cattle or chicken meat, has decreased. How do you think this would affect you and the rest of your household? Would you buy more of this food source and rely on it more? Would the lower price cause you to raise fewer of these animals but buy more at market? Would you change the proportion of your time that you spend on farming and instead allocate time to more profitable activities? Or maybe you wouldn’t do anything differently to what you do now?"

[Check to make sure the respondent understands what we mean by the above]

Livelihood and Income

Please tell us all the livelihood activities your household engages in (both for money or to meet subsistence needs).

If more than one livelihood activity, please tell me how much time you roughly spend on each activity.

3.1 Business as Usual (Baseline) Scenario:

Over the next five years I want you to imagine that everything remains the same as it is now. A percentage of the money that the National Park earns is distributed to communities, such as yours that border the park. Under this scenario, the money will be shared in exactly the same way as it is now and there will be no changes in conservation policies such as revenue sharing, law enforcement or regulated resource access.

3.1.1. Over the next five years, what changes would you expect in your households livelihood activities? Why would you expect these changes?

[[For each of the livelihood activities that would be affected, indicate if there would be an increase, decrease or no change]

[Follow up questions to generate discussion]

[Note: The below questions are to be asked during the discussion (if discussing an appropriate topic for example) or at the end of the discussion. They are not intended to be asked in a questionnaire format one after another, although they should always be asked at some point. The interview should remain semi-structured and allow the conversation to take its own direction to uncover further detail but the below will allow for direct comparisons between the scenarios and the baseline.]

3.1.2 Under this current scenario, how do you rate UWA's current policies in terms of their fairness for you and your household? (-2 is extremely unfair, 0 is neutral, and +2 is completely fair)

-2 | -1 | 0 | +1 | +2

Don't know / would rather not answer
3.1.3 What impact do you think living near the park has on your household on a scale of -2 to +2, where -2 is strongly negatively impacted, 0 is not impacted one way or the other and +2 is strongly positively impacted?

-2  -1  0  +1  +2

Don’t know/would rather not answer

3.1.4 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws from outside your village? For example, people from outside your village hunting bushmeat or taking part in illegal timber extraction or charcoal harvesting? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

-2  -1  0  +1  +2

Don’t know/would rather not answer

[Follow up questions]

3.2 Revenue sharing funds directed to human-wildlife conflict (HWC) mitigation

In this scenario I would like you to think about how revenue-sharing funds from the Park are spent. At present, UWA give some of the total money generated from entrance fees to districts which neighbour the park. Communities can then propose how the money should be spent by submitting an application form to the Local Council.

I would now like you to imagine that 20% of the entrance fee funds are still distributed to neighbouring districts, but one quarter (25%) of the amount a district receives must be spent directly on Human Wildlife Conflict mitigation measures. There will therefore be less money which could be spent on community projects, such as new schools or roads for example, but there will be more money that will be spent on preventing human wildlife conflict. For example, money might be spent on digging trenches, planting chilli fences or on watchmen.

3.2.1 Over the next five years, what changes would you expect in your household livelihood activities under this scenario? Why would you expect these changes?

[For each of the livelihood activities that would be affected, indicate if there would be an increase, decrease or no change compared to the baseline]

[Follow up questions to generate discussion]

3.2.2 Under this future scenario, how would you rate this policy in terms of its fairness for you and your household? (-2 is extremely unfair, 0 is neutral, and +2 is completely fair)

-2  -1  0  +1  +2

Don’t know / would rather not answer
3.2.3. Under this scenario, what impact do you think living near the park would have on your household on a scale of -2 to +2, where -2 is strongly negatively impacted, 0 is not impacted one way or the other, and +2 is strongly positively impacted?

-2  -1  0  +1  +2

Don't know/would rather not answer

3.2.4 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws from outside your village? For example, people from outside your village hunting bushmeat or taking part in illegal timber extraction or charcoal harvesting? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

-2  -1  0  +1  +2

Don't know/would rather not answer

3.2.5 Now, think about the same future scenario, but this time 50% of the funds are diverted. Which proportion of revenue sharing going to HWC would you prefer and why?

[Follow up questions]

3.3 Sustainable Hunting for Meat

Currently, there is a Memorandum of Understanding (MoU) between UWA and communities neighbouring MFNP/QENP which allows people with permits (“Authorised Resource Users”) to harvest certain resources from specific areas of the protected area, for example, herbal medicines or honey. Bushmeat hunting has never been permitted. Now, I would like you to imagine that the wildlife authorities are allowing increased access to resources by allowing some species of bushmeat to be hunted by authorised resource users (ARU’s), in the permitted zones only.

Research would need to be carried out first to determine which species of bushmeat could be safely hunted and permits would still be used to give people permission to hunt using permitted hunting methods only. For example, ARU’s might be allowed to hunt Uganda Kob using a bow and arrow or a spear. ARU’s would not be allowed to use snares and hunting would be strictly for subsistence, not for selling. Penalties would be introduced for all ARUs in the village if any evidence of illegal activity is found within in the park.

Please remember that this is a hypothetical future scenario which we are interested in researching. It is not something that UWA is necessarily considering for implementation at MFNP/QENP or elsewhere in Uganda, and although I will inform UWA of the general results of this study, there is no commitment by them or anyone else to implement any policy changes which I suggest as a result of this work.
3.3.1 If hunting bushmeat species such as Uganda Kob in the resource use zones was permitted for ARUs, over the next five years, what changes would you expect in your household's livelihood activities? Why would you expect these changes?

[For each of the livelihood activities that would be affected, indicate if there would be an increase, decrease or no change compared to the baseline]

[Follow up questions to generate discussion]

3.3.2 Under this future scenario, how would you rate this policy in terms of its fairness for you and your household? (-2 is extremely unfair, 0 is neutral, and +2 is completely fair)

-2 -1 0 +1 +2

Don't know / would rather not answer

3.3.3. Under this scenario, what impact do you think living near the park would have on your household on a scale of -2 to +2 , where -2 is strongly negatively impacted, 0 is not impacted one way or the other, and +2 is strongly positively impacted?

-2 -1 0 +1 +2

Don't know/would rather not answer

3.3.4 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws from outside your village? For example, people from outside your village hunting bushmeat or taking part in illegal timber extraction or charcoal harvesting? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

-2 -1 0 +1 +2

Don't know/would rather not answer

[Follow up questions]

3.4 Withdraw all current access

Now, in contrast to the previous scenario, I would like you to think about a future scenario in which all current access to natural resources within the national park is withdrawn. I want you to imagine that all permits or MoUs are revoked and no access to the park would be allowed for any reason. Anyone found in the park is therefore there illegally.

3.4.1 Over the next five years, what changes would you expect in your households livelihood activities? Why would you expect these changes?

[For each of the livelihood activities that would be affected, indicate if there would be an increase, decrease or no change compared to the baseline]

[Follow up questions to generate discussion]
3.4.2 Under this future scenario, how would you rate this policy in terms of its fairness for you and your household? (-2 is extremely unfair, 0 is neutral, and +2 is completely fair)

-2  -1  0  +1  +2

Don't know / would rather not answer

3.4.3. Under this scenario, what impact do you think living near the park would have on your household on a scale of -2 to +2, where -2 is strongly negatively impacted, 0 is not impacted one way or the other, and +2 is strongly positively impacted?

-2  -1  0  +1  +2

Don't know/would rather not answer

3.4.4 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws from outside your village? For example, people from outside your village hunting bushmeat or taking part in illegal timber extraction or charcoal harvesting? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

-2  -1  0  +1  +2

Don't know/would rather not answer

[Follow up questions]

3.5 Wildlife Friendly Enterprise Scheme

Now I’d like you to imagine that UWA set up a scheme which will help people receive a stable income from growing certain crops or resources. These crops or resources would be chosen based on their ability to deter problem wildlife. For example, chilli plants could be grown or honey produced and the chilli and bees could help to deter wildlife. This scheme would be open to everyone who wants to get involved, and whoever participates would be guaranteed a premium price for these products on the agreement that they do not participate in any wildlife crime (such as entering the park to hunt for bushmeat). If you were found to have committed an illegal activity, you would be removed from this scheme for a period of one year.

As an example, an average income for selling honey as part of this scheme would be in the region of 500,000 shillings per year.

3.5.1 Over the next five years, what changes would you expect in your households livelihood activities? Why would you expect these changes?

[For each of the livelihood activities that would be affected, indicate if there would be an increase, decrease or no change compared to the baseline]

[Follow up questions to generate discussion]
3.5.2 Under this future scenario, how would you rate this policy in terms of its fairness for you and your household? (-2 is extremely unfair, 0 is neutral, and +2 is completely fair)

-2  -1  0  +1  +2

Don't know / would rather not answer

3.5.3. Under this scenario, what impact do you think living near the park would have on your household on a scale of -2 to +2 , where -2 is strongly negatively impacted, 0 is not impacted one way or the other, and +2 is strongly positively impacted?

-2  -1  0  +1  +2

Don't know/would rather not answer

3.5.4 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws from outside your village? For example, people from outside your village hunting bushmeat or taking part in illegal timber extraction or charcoal harvesting? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

-2  -1  0  +1  +2

Don't know/would rather not answer

[Follow up questions]

3.6. Eco – guards and Anonymous Text Scheme

I’d now like you to imagine a future scenario in which UWA will work to increase the number of community members employed by the park by employing local people as eco-guards. Employment would be based on a person’s knowledge of the environment and wildlife and at least two local people from each village that neighbours the park would be employed. Eco would work with both their community and UWA to reduce human wildlife conflict and build relationships between the park authorities and the local community.

Their responsibilities would be as follows:
- Responding to human wildlife conflict
- Monitoring illegal incursions
- Checking for snares
- Informing UWA on wildlife crime

Eco guards would not have power of arrest.

3.6.1 Over the next five years, what changes would you expect in your households livelihood activities? Why would you expect these changes?

[For each of the livelihood activities that would be affected, indicate if there would be an increase, decrease or no change compared to the baseline]

[Follow up questions to generate discussion]
4.6.2 Under this future scenario, how would you rate this policy in terms of its fairness for you and your household? (-2 is extremely unfair, 0 is neutral, and +2 is completely fair)

Don't know / would rather not answer

3.6.3. Under this scenario, what impact do you think living near the park would have on your household on a scale of -2 to +2, where -2 is strongly negatively impacted, 0 is not impacted one way or the other, and +2 is strongly positively impacted?

Don't know/would rather not answer

3.6.4 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws from outside your village? For example, people from outside your village hunting bushmeat or taking part in illegal timber extraction or charcoal harvesting? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

Don't know/would rather not answer

3.7 Now, I would like you to imagine that the wildlife authority introduce a new system to catch people participating in larger scale commercial wildlife crime. Under this scenario, a reward would be offered for people who send a text which leads to the successful arrest and charge of ivory poachers. This would work through an anonymous text scheme where people can text in if they see people illegally poaching in the park or have evidence of someone involved in ivory poaching. In return for reliable information, the person sending the text would receive a financial reward of 150,000 shillings if the person is successfully arrested.

3.6.7.1 Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

Don't know/would rather not answer

3.7.1 Now I’d like you to imagine that under this scenario, a similar, but financially lower reward, would be offered for people who send a text which leads to the successful arrest of people who have been participating in crimes such as bushmeat hunting, timber harvesting and charcoal extraction. This would work in the same way and people would receive 15,000 shillings for information that leads to a successful arrest.
Under this scheme, how likely are you to inform the park authorities about wildlife crime that you have observed while in the park, or people you have seen or heard about breaking the wildlife laws? (Where -2 is very unlikely, 0 is possibly, +2 is very likely)?

-2 -1 0 +1 +2

Don't know/would rather not answer