THE TASK FORCE ON HUMAN-WILDLIFE

CONFLICT COMPENSATION SCHEMES

Product design and claim administration process.

July 2020

REPUBLIC OF KENYA

MINISTRY OF TOURISM AND WILDLIFE

Table of Contents

List of Acronyms 2

Executive summary 3

Introduction 6

Objective 6

Purpose 6

Data 7

Limitations of the data 8

Methodology 9

Assumptions 10

Death and Permanent Total Disability (PTD) 10

Bodily Injury 10

Property & Crop Damage 11

Pricing Results and Scenarios 12

Impact of increasing the Death Benefit Payout to KES 5M 13

Stress Testing of Results 14

Financial Forecast 15

Conclusions and Recommendations 18

References 19

List of Acronyms

CVO- Community Verification Officers

FAO- Food and Agriculture Organization

HWC- Human-wildlife conflict

KWS- Kenya Wildlife Service

DWCC- District wildlife compensation committee

NWCC- National wildlife compensation committee

P&S- Pain and Suffering

PTD- Permanent Total Disability

TTD- Total Temporary Disability

Executive summary

An insurance plan to take over the compensation of the victims of human wildlife conflict is estimated to cost **KES 3.5B** with snakes covered and **KES 1.6B** without including snakes. The plan is expected to provide the following covers: Death; Bodily injuries i.e. Permanent total disability (PTD) and pain/Suffering (P&S) and medical expenses; Agriculture cover i.e. Crop damage and Livestock predation; Property coverage. The Death benefit level is a significant cost driver for this plan since it affects the death payout plus the PTD payouts. The above price estimate is based on a **KES 3M** death benefit. Assuming **KES 5M** death benefit, the price increases to **KES 4.5B** and **2.0B** respectively i.e. increases of **27%** and **20%** respectively. The highest cost contributors are bodily injury claims, death and Livestock predation respectively. Assuming the cases for the above coverages increases by over 30%, the cost of the plan will be affected adversely. Because of this, a pilot, to ascertain the KWS experience, is highly recommended.

Assuming the data provided is accurate, the long-term cost for this plan is forecasted to stabilize at about **KES 3B** with snakes covered and **KES 1.5B** without snakes annually. However, a few limitations were noted with the data, notably the inconsistencies between the two main data sets supplied by the KWS namely the compensation data and the incidence data. To curtail this, data from other sources including the Big life foundation was used to try and substantiate the data that was provided by the KWS. Expert opinion was also used to derive and validate some of the assumptions used in the pricing work. All the mitigations, both those in place and planned for in the near future, were considered in the pricing. This however may be determined conclusively if data collection methods are improved and a pilot may shed more light on this. All the prices above have been calculated assuming a **10% commission** payment and can be reviewed based on the final commission terms that will be agreed upon.

Due to the shortcoming of the data and given that this is a first in the insurance industry, a pilot of not less than 6 months is highly recommended. The following counties have been proposed for an 8-month pilot with an estimated cost as shown below.

Condition	Cost in Counties (KES)				Combined (KES)
	Taita Taveta	Kajiado	Narok	Meru	
With Snakes	170,335,032	127,582,041	119,230,255.33	105,870,847.33	**523,018,176**
Without Snakes	107,616,836	55,343,230	94,528,922	83,807,017	**341,296,005**

The proposed counties are some of the HWC hotspots in the country which have a holistic view of the different types of the conflict. Kajiado and Taita Taveta are among the chosen counties with significant exposures to snakes. Although snakes have been excluded in the current

schedule, a pilot with snakes is strongly recommended so that the experience from the counties can be used to inform a final decision on snakes.

Background

Human-wildlife conflict (HWC) refers to the interaction between wildlife and human beings often leading to some form of loss. The types of losses include injury or death to both humans and wildlife, livestock predation and depredation, and crop and property damage. HWC is caused by many factors, the most common being climate change and increasing human population. These two factors lead to reduced food and water, putting pressure on common space and resources. Communities that experience such losses are less perceptive toward conservation and retaliate by killing wildlife.

Thus, measures to reduce the severity of conflict losses and improve community tolerance to wildlife are used by conservation managers. Mitigation on human-wildlife conflicts can reduce the magnitude of losses incurred by communities (Breitenmoser et al., 2005; Marker, Dickman & Macdonald, 2005; Woodroffe et al., 2007) thereby promoting co-existence. Mitigation measures include both financial incentives and physical measures. However, effective wildlife mitigation calls for a multifaceted approach. Therefore, a combination of mitigation measures is often recommended in situations of human-wildlife conflict. For instance, the most common physical mitigation measures (in form of barriers e.g. fences) used for the larger mammals such as the elephants often fail as the animals learn to circumvent barriers (Osborn & Parker 2002; Dublin & Hoare 2004; Hoare 2012).

Insurance is one of the ways to provide financial mitigation to the communities impacted by HWC. Sustainable financial mitigation requires support such as physical preventive measures to mitigate risk accordingly. Toward this, the taskforce has designed a product which seeks to console the communities affected by HWC from various losses. The product centres around four HWC incident types namely: death & injury, property damage, crop destruction and livestock predation. It is designed to offer fast and reasonable pay-outs to the affected communities, encourage coexistence between humans and wildlife, and therefore promote conservation in Kenya.

Following the product design, pricing is done for the purpose of setting premiums. Premium rates are derived from actuarial analysis ensuring the premium will be sufficient to cover future claims and expenses that will be incurred over a certain time frame (usually) in a way that makes financial sense (Wrede & Phily, 2016). The pricing methodology used in setting the estimated premiums for the HWC Insurance Scheme is the experience methodology; the experience data utilised for this report was made available by the Kenya Wildlife Service (KWS) which has consistently collected data on human-wildlife conflicts. Specifically, pricing was done using the HWC incident and compensation data between the years 2008 and 2018.

The Human Wildlife Conflict Task Force which came into force on the 14th of June 2019, was formed by the Cabinet Secretary of the Ministry of Tourism and Wildlife, after a National Consultative forum. The forum brought together the stakeholders from the insurance industry, government and community-based organisations to discuss matters of Human HWC with the intention of forging a concrete and sustainable way forward.

Introduction

Pricing is the process of costing an insurance product. Pricing is part of the product development and forms the core part of the pricing control cycle which involves planning, pricing and monitoring. The focus of this report is mainly on pricing. Other elements of the product development have been considered elsewhere in the overall report.

Objective

The objective of the task force is to estimate the cost of insurance option to the government if they chose to insure against the claims raised by the public as a result of human wildlife conflict. The aim is to estimate a premium that is sound to the insurance companies and at the same time not burdensome to government.

Purpose

The purpose of this report is to show how we arrived at the price estimate. It will describe the methodology, assumptions and finally show various scenarios based on the data supplied.

Data

To arrive at the premiums, we have relied on data from the following sources. Our primary source of data was the data supplied by the Kenya wildlife service (KWS). Two data sets were supplied.

1. Compensation data

   This data set has details of each case that the government has compensated victims of the human wildlife conflict. The data shows the county where each incidence occurred, type of conflict, the responsible animal i.e. which wildlife animal, the amount of compensation recommended by the District wildlife compensation committee (DWCC) and the final amount approved by the National wildlife compensation committee (NWCC).

2. Incidence data

   The incidence data has details on each incidence of human wildlife interaction as reported and captured by the Kenya wildlife service. These are cases reported and shows no input on amount claimed. The data contains, incidence date, type of problem, affected crop/animal/person, quantity of damage, area/county and location, the responsible animal and the action taken. The incidence date is the date which the incidence occurred.

There are four types of problems namely;

- Crop damage
- Predation
- Human death
- Human injury
- Human threat
- Property damage

The affected crop/animal/person specify exactly what was damaged or destroyed. The quantity of damage column shows quantity destroyed; for crop damage it is in acres, and for livestock and human beings, it is the count killed or injured. The responsible animal column shows the wild animal that is the cause of the incidence e.g. hyena or lion etc.

We also relied on other secondary sources of data including but not limited to published research done external parties e.g. wildlife conservation organizations and individuals like Big life foundation which is a conservancy foundation based in the Amboseli ecosystem. We also looked at data from other related organizations such as the Food and Agriculture Organization (FAO) on information such as the number and distribution of livestock.

Limitations of the data

The following limitations of the data supplied were noted and presented to the taskforce technical team for deliberations.

On both compensation and incidence data supplied by the KWS, it was noted that, not all the incidences reported are captured/reported in the compensation data. It had been anticipated that all reported incidences would flow to the various compensation committees for evaluation. However, it was noted that this was not necessarily the case. While one would expect that the compensation data be a sub-set of the Incidence data, the two data sets are not consistent. For instance, for human death and injury, the compensation data showed that a higher number of claims that were submitted when compared to the incidence data. This brought out the issues of credibility with regards to the two data sets. Other limitations include missing values and seemingly inflated values that seemed incorrect.

Another major issue with the data was inconsistencies between information from different sources. Other non-state agencies, who work in specific areas, recorded higher number of incidences/cases than the government data. For instance, the Big life data shows more than 10,000 cases of shoats (covering the Biringanya area in Masai Mara) compared to KWS 400 cases across the country. This points out to the likelihood that not all reports are reported to KWS. The team looked at these cases and adjusted the number through expert analysis. To curb the possibility that the information at hand may be underreported, *what if* scenarios have been provided to show how the cost of the scheme may change if more people start reporting the incidences as will most likely be the case with the introduction of the scheme.

All these issues were raised to the KWS personnel who attempted to further clean the data. Furthermore, because of these limitations, it was decided that the two data sets be used independently to project expected cases per year for different covers. For crop damage, predation and property damage, Incidence data and other external data sources was used. For Human injury and death, compensation data was used.

Methodology

The burning cost method was used to estimate the total cost of the insurance plan. The burning cost method uses historical experience as the basis, adjusted for current cost savings expected from in place mitigation strategies, to form our base price. The risk premium is based on the average past loss experience, **suitably adjusted to reflect changed loss costs and exposures**. The risk premiums is then loaded by a **management/administration expense amount, commission and a risk margin** to arrive at the **gross premiums**.

The expected cost of compensation amounts is estimated as per the formula below;

Expected Cost of Compensation payout = Expected No of Cases x Expected Payout

The expected number of cases and the resulting expected compensation payments have been determined separately for each of the benefits covered in the product i.e. Human Death, Bodily Injury, Predation, Crop damage and Property damage.

Administration costs **include,**

- Costs of administering the policy including on-boarding of the plans
- Costs of verifying HWC compensation claims
- Costs involved in the settlement of approved HWC compensations claims.
- Training e.g. Community Verification Officers (CVO) training.
- Transportation i.e. for the CVO etc. to places of incidences.
- Technology requirements e.g. phones, GPR mapping etc.

Assumptions

Assumptions have been hugely derived from the data supplied and through expert discussions to inform areas where the numbers seemed incorrect. The assumptions consider current mitigation strategies in place. With the help of experts from various conversations agencies, the private sector, KWS team, and Re/insurance experts, we arrived at the following assumptions.

Death and Permanent Total Disability (PTD)

From the compensation data, we estimate on average, 200 cases of death per annum. The payout proposed for each death case is a sum of **KES 3,000,000.**

The data reveals about 3000 injuries per annum out of which we estimated 15% may result to PTD. The payout shall be calculated on the basis of the **death benefit** above subject to the minimum and maximum amounts set out in the **continental scale**. It is assumed that the average payout will be at **50%** of the Death Benefit.

Lastly, it is assumed that about **60%** of death cases are caused by snakes.

Bodily Injury

Two covers are provided;

- Medical expenses
- Pain and Suffering

It was noted that a majority of the population affected by HWC are in rural areas with no formal employment hence Temporary Total Disability (TTD) may not be a major risk for this group. Thus, instead of the TTD benefit, we have offered a **pain and suffering coverage** payable to all casualties of the HWC.

It is assumed that all the 3000 injuries cases will incur a medical cost with an average amount of **100%** of the limit.

Pain and suffering damages payout are based on monthly approach. Under this method, a certain amount is assigned to every month from the day of the accident until the claimant reaches maximum recovery of up to 12 months. The minimum monthly rural wage of **KES 13,500** as the monthly payout Based on the data supplied and a study of historical cases, claimants take 3 to 6 months on average to completely recover from most incidences although there are cases that go for more than 1 year.

Based on the data, it was assumed that **75%** of injury cases are caused by snakes.

Property & Crop Damage

On property damage, **250** cases are expected per annum with an average payout amount of **KES 120,000**. For crops damage, about **1,700** incidences will be expected per annum. The average acreage affected per incidence is **1.5 acres**. The cost of input per acre has been fixed at **KES 15,000**. The basis of this estimate is from the average cost of input required to farm an acreage of maize which is the staple food for most communities in Kenya and appeared as the crop damaged most frequently in the incidence data.

Pricing Results and Scenarios

The table below shows the estimated cost to the government for such a scheme. It was noted that most of the injury and/or death cases are caused by snakes. This taskforce has deliberated on whether or not include snakes in the schedule of animals to be compensated with regards to HWC. To accommodate these deliberations, the results will reflect both cases of when snakes are included (**With Snakes**) and excluding snakes (**W/o Snakes**). Based on the data provided and assumptions above, the estimated cost to the government for this scheme is **KES 3.435 B with Snakes and KES 1.6 B without (W/o) snakes**. The price reflects expert opinions and current mitigation strategies in place.

Table 1 Below shows the breakdown of the premiums into various components.

		In Millions	
	Item	**With Snakes**	**W/o Snakes**
A	**Death**	**600**	**240**
B	**Injury Benefits**	**1,434**	**425**
C	PTD	675	169
	Pain & Suffering	207	52
	Medical Expenses	450	113
	Xol	102	92
D	**Agriculture Coverage**	**345**	**345**
	Livestock Predation	306	306
	Crop Damage	38	38
E	**Property Damage**	**30**	**30**
F = SUM (A…E)	**Risk Premium**	**2,408**	**1,039**
G = 5% of F	**Risk Margin**	**120**	**52**
	Admin Expenses		
H	Salaries - CVOs & CIR	214	150
I	Transport - CVOs	26	18
J	IT	32	32
K	Investigation costs	102	51
L	Training & awareness	188	94
M= Sum(H,I,J,K,L)	**Total Admin Expenses**	**563**	**346**
N=10% of O	**Commission**	**344**	**160**
O=(F+G+H+M+N)	**Gross Premiums**	**3,435**	**1,597**

Table 1: Breakdown of Premiums

Impact of increasing the Death Benefit Payout to KES 5M

It was noted that the amount of death benefit award is a major driver of cost for this product as it ultimately affects both death payouts and PTD payouts. The results in table 1 above assumes a proposed death benefit of **KES 3M** which is a variation of the statutory proposed limit of **KES 5M**. Because of the significance of this benefit, the **table 2** below shows impact on cost if the death benefit limit is increased to **KES 5M**.

		In Millions	
	Item	**With Snakes**	**W/o Snakes**
A	**Death**	**1,000**	**400**
B	**Injury Benefits**	**1,884**	**537**
C	PTD	1,125	281
	Pain & Suffering	207	52
	Medical Expenses	450	113
	Xol	102	92
D	**Agriculture Coverage**	**345**	**345**
	Livestock Predation	306	306
	Crop Damage	38	38
E	**Property Damage**	**30**	**30**
F = SUM (A…E)	**Risk Premium**	**3,258**	**1,312**
G = 5% of F	**Risk Margin**	**163**	**66**
	Admin Expenses		
H	Salaries - CVOs & CIR	214	150
I	Transport - CVOs	26	18
J	IT	32	32
K	Investigation costs	102	51
L	Training & awareness	188	94
M= Sum(H,I,J,K,L)	**Total Admin Expenses**	**563**	**346**
N=10% of O	**Commission**	**443**	**191**
O=(F+G+H+M+N)	**Gross Premiums**	**4,427**	**1,915**

Table 2: Premium cost with 5M death benefit

From the table, premiums can be expected to increase by **20% to 27%** from **KES 1.5B to KES 2.0B** without snakes and **KES 3.5B to KES 4.4B** with snakes respectively.

Stress Testing of Results

The table below shows the impact of each item on price assuming incidence cases increases by the percentages shown in the first row of the table.

From the table, the highest risks are from the following coverages:

1. Bodily injury coverages i.e. PTD, P&S and medical expenses
2. Death Cover.
3. Livestock predation if we remove snakes.

For instance, an increase of death cases by 30% increases cost by 6%. Similarly, an increase of Injury cases by 30% increases the overall cost by 15%. An increase of both death and injury cases by 30% result to an increase of cost by more 21%.

Table 3 – With Snakes

	% Increase				
Items	**10%**	**20%**	**30%**	**50%**	**100%**
Death Cases	2%	4%	6%	10%	20%
Injury	5%	10%	15%	24%	49%
Animal Predation	1%	2%	3%	5%	10%
Crop Damage	0%	0%	0%	1%	1%
Property Damage	0%	0%	0%	0%	1%
Death Plus Injury	7%	14%	21%	35%	69%

Table 3: Impact of incidental increases on price per Incident type (With Snakes)

Table 4 below shows the same analysis without snakes.

Table 4: Without Snakes

	% Increase				
Items	**10%**	**20%**	**30%**	**50%**	**100%**
Death Cases	2%	4%	5%	9%	18%
Injury	2%	5%	7%	12%	24%
Animal Predation	2%	4%	7%	11%	22%
Crop Damage	0%	1%	1%	1%	3%
Property Damage	0%	0%	1%	1%	2%
Death Plus Injury	4%	8%	13%	21%	42%

Table 4: Impact of incidental increases on price per Incident type (Without Snakes)

NB: Without snakes, Injury and Animal predation also becomes a significant parameter.

Due to the shortcomings of the data provided and the possibility that it is highly likely that not all cases might have been reported, the stress test results above shows the likely cost increase if the actual cases vary from the expected cases based on the data.

Financial Forecast

The government is actively working to minimize cases of HWC by continually implementing mitigation measures. Several conflict management strategies have been/ are being to put in place to mitigate and prevent the conflict[1]. These measures are expected to reduce cases of HWC and consequently may affect the cost of the insurance plan in future. The estimated reduction of conflict by these projects and the cost implication to the insurance plan in the long term have been considered. The table below shows the expected cost reduction to the plan once the top 10 strategies are complete[2].

From the data provided, the long-term financial position of this plan is forecasted based on the following assumptions.

1. From the mitigation strategies provided, the predominant strategy by the government is the installation of fences, which has been effective the determent of large mammals such as elephants. Thus, the impact these fences will have on HWC in the future have been estimated. The data provided by KWS has been used to estimate the proportion of incidences associated with larger animals and the table below shows the ratios. For instance, only 12% of death cases in the compensation data was caused by the big mammals.

	Proportion
DEATH	12%
INJURY	8%
CROP DESTRUCTION	30%
PREDATION	27%
PROPERTY DAMAGE	50%

Table 5: Percentage reduction with 100% effectiveness of fences

The table gives the best estimate of percentage reduction in cases assuming 100% effectiveness of fences and that the whole ecosystem will be fenced at the completion of the project which is implausible. Because of this improbability other scenarios have been provided based on various proportion of effectiveness. The table below shows the various scenarios.

[1] More information on these strategies are documented in the HWC Taskforce report on ***Human wildlife Conflict Management and Mitigation***

[2] Some of the projects are yet to start or be completed with no clear completion date. As a result, some of the time depended projections may be affected.

	Max	Median	Min	Others
DEATH	12%	6%	3%	3%
INJURY	8%	4%	2%	3%
CROP DESTRUCTION	30%	15%	7%	10%
PREDATION	27%	13%	7%	10%
PROPERTY DAMAGE	50%	25%	13%	0%

Table 6: Percentage reduction with various degrees of effectiveness of fences

The maximum percentage reduction column is same as the above and represents an assumption that the fences will inhibit 100% of the cases by large animals. The median scenario assumes 50% effectiveness of the fences once complete and the minimum scenario assumes a 25% effectiveness. The **Others** column represent the impact of the other mitigation strategies apart from physical barriers.

2. Another significant assumption for the financial forecast is the long-term administration expenses for the plan. The first-year expenses are steep due to the initial setting up expenses that one would expect to reduce after initial set up. A long-term expense average of **KES 250M** has been assumed based on the breakdown provided by the team.

Based on the above assumptions, the table below shows the long-term projected position of this plan assuming all the mitigation suggested are implemented.

Table 5: With Snakes

	Best Case	Expected	Worst Case
Death	**466,050,420.17**	**503,025,210.08**	**521,512,605**
TPD	552,278,633	579,889,317	593,694,658
P&S	168,997,262	177,446,131	181,670,565
Medical Expenses	368,185,756	386,592,878	395,796,439
XOL	83,455,438	87,627,719	89,713,859
Bodily Injury	**1,172,917,089**	**1,231,556,044**	**1,260,875,522**
Camels	6,300,000	6,300,000	6,300,000
Cattle	180,000,000	180,000,000	180,000,000
Goats	56,250,000	56,250,000	56,250,000
Sheep	56,250,000	56,250,000	56,250,000
Donkeys	7,500,000	7,500,000	7,500,000
Animal Predation	**306,300,000**	**306,300,000**	**306,300,000**

Property Damage	12,000,000	19,500,000	23,250,000
Crop Damage	23,107,047	28,766,023	31,595,512
Claim Cost	1,980,374,556	2,089,147,278	2,143,533,639
Risk Margin	99,018,728	104,457,364	107,176,682
Risk Premiums	**2,079,393,283**	**2,193,604,642**	**2,250,710,321**
Salaries - CVOs & CIR	198,980,586	198,980,586	198,980,586
Transport - CVOs	23,925,088	23,925,088	23,925,088
IT	7,541,800	7,541,800	7,541,800
Investigation costs	96,436,398	96,436,398	96,436,398
Training & awareness	103,427,072	103,427,072	103,427,072
Administration Cost	**430,310,944**	**430,310,944**	**430,310,944**
Commissions	**278,856,025**	**291,546,176**	**297,891,252**
Gross Premiums	**2,788,560,253**	**2,915,461,762**	**2,978,912,516**

Table 6: Without Snakes

	Best Case	**Expected**	**Worst Case**
Death	**186,420,168.07**	**201,210,084.03**	**208,605,042**
TPD	138,069,658	144,972,329	148,423,665
P&S	42,249,315	44,361,533	45,417,641
Medical Expenses	92,046,439	96,648,219	98,949,110
XOL	75,109,894	78,864,947	80,742,474
Bodily Injury	**347,475,307**	**364,847,028**	**373,532,889**
Camels	6,300,000	6,300,000	6,300,000
Cattle	180,000,000	180,000,000	180,000,000
Goats	56,250,000	56,250,000	56,250,000
Sheep	56,250,000	56,250,000	56,250,000
Donkeys	7,500,000	7,500,000	7,500,000

Animal Predation	**306,300,000**	**306,300,000**	**306,300,000**
Property Damage	12,000,000	19,500,000	23,250,000
Crop Damage	23,107,047	28,766,023	31,595,512
Claim Cost	875,302,522	920,623,136	943,283,443
Risk Margin	43,765,126	46,031,157	47,164,172
Risk Premiums	**919,067,648**	**966,654,293**	**990,447,615**
Salaries - CVOs & CIR	198,980,586	198,980,586	198,980,586
Transport - CVOs	23,925,088	23,925,088	23,925,088
IT	7,541,800	7,541,800	7,541,800
Investigation costs	96,436,398	96,436,398	96,436,398
Training & awareness	103,427,072	103,427,072	103,427,072
Administration Cost	**430,310,944**	**430,310,944**	**430,310,944**
Commissions	**149,930,955**	**155,218,360**	**157,862,062**
Gross Premiums	**1,499,309,546**	**1,552,183,596**	**1,578,620,621**

Based on the data provided and the above assumptions, the expected long-term forecast of the financial cost of this plan is at about **KES 3B** with snakes and **KES 1.6B** without snakes.

Conclusions and Recommendations

The cost estimates above are based on the data provided by KWS. We identified several shortcomings in the data that was provided attributed to under reporting of HWCs cases. The estimated costs above can be therefore be taken as the least possible cost incase all cases were not being reported. We would also expect a euphoria effect when the public starts being confidence of the insurance plan settling their claims.

We highly recommend a ***pilot phase*** for at least 8 months. During this period, data should be collected to validate the assumptions above and enhance the pricing. Alternative to piloting, a census on livestock predation, injuries and deaths in 3 to 4 major ecosystems or counties can be done to validate the number of cases expected. The following counties have been proposed for an 8-month pilot with an estimated cost as shown below.

Condition	Cost in Counties (KES)				Combined (KES)
	Taita Taveta	Kajiado	Narok	Meru	
With Snakes	170,335,032	127,582,041	119,230,255.33	105,870,847.33	**523,018,176**
Without Snakes	107,616,836	55,343,230	94,528,922	83,807,017	**341,296,005**

References

Breitenmoser, U., Angst, C., Landry, J-M., Breitenmoser-Wursten, C., Linnell, J.D.C. & Weber, J-M. (2005). Nonlethal techniques for reducing depredation. In People and wildlife: conflict or co-existence?: 49–61. Woodroffe, R.,Thirgood, S. & Rabinowitz, A. (Eds). Cambridge: Cambridge University Press

Dublin HT, Hoare RE. 2004. Searching for solutions: the evolution of an integrated approach to understanding and mitigating human– elephant conflict in Africa. Human Dimensions of Wildlife 9:271–278.

Hoare R. 2012. Lessons from 15 years of human–elephant conflict mitigation: management considerations involving biological, physical and governance issues in Africa. Pachyderm 51:60–74.

Marker, L.L., Dickman, A.J. & Macdonald, D.W. (2005). Perceived effectiveness of livestock guarding dogs placed on Namibian farms. Range. Ecol. Mgmt. 58, 329–336.

Osborn FV, Parker GE. 2002. Community-based methods to reduce crop loss to elephants: experiments in the communal lands of Zimbabwe. Pachyderm 33:22–31

Woodroffe, R., Frank, L.G., Lindsey, P.A., Ole Ranah, S.M.K. & Romanach, S. (2007). Livestock husbandry as a tool for carnivore conservation in Africa's community rangelands: a case–control study. Biodivers. Conserv. 16,1245–1260.

Wrede, P., & Phily, C. (2016). *Pricing for Microinsuance: A technical guide*. Impact Insurance and International Labour Organization.

REPUBLIC OF KENYA

MINISTRY OF TOURISM AND WILDLIFE

The Principal Secretary,
State Department for Wildlife
Ministry of Tourism and Wildlife
P.O. Box 30430 – 00100
Nairobi, Kenya
Email: pswildlife@tourism.go.ke