

# HUMAN-WILDLIFE CONFLICT STUDY REPORT

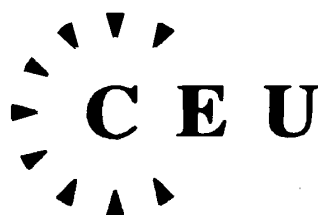
## Vwaza Marsh Wildlife Reserve, Malawi



*Prepared by:*

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*December 2009*



## **FOREWORD**

This report was prepared on behalf of the Malawi Department of National Parks and Wildlife (DNPW), Vwaza Marsh Wildlife Reserve (VMWR) and its surrounding communities by researchers at the Remote / Rural Communities and the Environment Program, of the Centre for Environment and Security (CENSE), Central European University (CEU). This research was requested by the Malawi Department of National Parks and Wildlife (specifically, the VMWR) and this report is meant to guide further discussion of mitigating problem animal conflicts between VMWR and its neighbours, and offer avenues for further research.

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# TABLE OF CONTENTS

FOREWORD.....	2
ACKNOWLEDGEMENTS .....	2
LIST OF FIGURES .....	4
LIST OF TABLES.....	4
1. INTRODUCTION.....	5
2. METHODS.....	6
2.1. Archival analysis.....	6
2.2. Semi-structured interviews .....	7
2.3. Zone Meetings.....	7
2.4. Participatory Mapping.....	9
3. ZONE MEETING RESULTS (DISCUSSION).....	10
3.1. In the past 3 years, has your village(s) ever had problems with wild animals?.....	10
3.2. If yes, what type of problem(s)?.....	10
3.3. Where do these animals come from? How do you know they come from there? .....	11
3.4. What animals are most responsible for these problems and why? Please number from one (most damaging) to five (5 <sup>th</sup> most damaging). Are there others which are problematic? .....	11
3.5. How do conflicts with wild animals affect your livelihood?.....	18
3.6. If crops or livestock are destroyed, or people are attacked by wild animals, what should someone do? What usually happens when someone follows this route?.....	18
3.7. In your opinion, have problems with wild animals in your village increased or decreased in recent years? Why do you say so?.....	20
3.8. In your opinion, who <u>is</u> primarily responsible for wildlife in your area?.....	21
3.9. In your opinion, who <u>should be</u> responsible for wildlife in your area? Why do you say so?.....	21
3.10. In your opinion, what do you think should be done to reduce conflicts with wild animals? .....	22
3.11. Is the VMWR beneficial or not? Why do you say so? .....	23
4. ZONE MEETING RESULTS (PARTICIPATORY MAPPING).....	24
5. DISCUSSION & RECOMMENDATIONS .....	25
5.1. Institutional arrangements.....	26
5.2. Information & reporting.....	31
5.3. Control options .....	32
5.4. Compensation .....	38
5.5. Further research.....	39
5.6. Summary.....	40
6. REFERENCES.....	41
APPENDIX A: PARTICIPATORY MAPS.....	45
Zolokele Zone (1).....	45
Zolokele Zone (2).....	46
Zolokele Zone (3).....	47
Mwazisi Zone.....	48
Mphangala Zone .....	49
Kamphenda Zone (1).....	50
Kamphenda Zone (2).....	51
Kazuni Zone.....	52
Thunduwike Zone.....	53
Zaro Zone.....	54
APPENDIX B: TAXONOMIC NOMENCLATURE.....	55

## LIST OF FIGURES

Figure 1: Location of VMWR in relation to northern Malawi and Zambia .....	6
Figure 2: VMWR Community Zones .....	7
Figure 3: Zolokele Zone meeting .....	8
Figure 4: Kamphenda Zone meeting.....	8
Figure 5: Traditional Chiefs at Kamphenda .....	8
Figure 6: Participatory mapping exercise.....	10
Figure 7: The ‘worst’ problem animal according to local communities .....	12
Figure 8: Elephant damage within VMWR.....	13
Figure 9: Ranking of various problematic taxa and their distribution by Zone.....	15
Figure 10: Extent and condition of fence along VMWR border.....	22
Figure 11: Estimated population (blue) and density (red) of elephants in VMWR (1985-2007). .....	28
Figure 12: Nyika TFCA areas .....	29
Figure 13: The adaptive management process for human-wildlife conflict (HWC).....	31
Figure 14: The use of HWC interventions under practical constraints .....	40

## LIST OF TABLES

Table 1: Types of human-wildlife conflict in zones surrounding VMWR .....	11
Table 2: Ranking of problem animals by zones adjacent to VMWR.....	14
Table 3: Reasons given for ranking particular taxa by meeting participants .....	16
Table 4: Extent of households affected by problem animals per Zone .....	18
Table 5: Community perceptions on protocol concerning PA reporting.....	19
Table 6: Community perceptions concerning PA trends.....	20
Table 7: Community perceptions on institutional roles and responsibilities concerning problem animal control.....	21
Table 8: Overall community perceptions of VMWR.....	23
Table 9: Factors influencing local tolerance to wildlife pests.....	25
Table 10: Range of human-wildlife conflict control options and level of effectiveness.....	34

## 1. INTRODUCTION

Human-wildlife conflict is defined as "any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment" (WWF 2005). Conflicts between humans and wildlife are the product of socio-economic and political landscapes and are controversial because the resources concerned have economic value and the species involved are often high profile and legally protected (Treves and Karanth 2003; McGregor 2005). While humans and wildlife have co-existed for millennia, the frequency of conflicts involving problem animals has grown in recent decades, mainly because of the exponential increase in human populations and consequential expansion of human activities (Woodroffe 2000; Woodroffe et al. 2005), expansion of wildlife distributions (Breitenmoser 1998; Zedrosser et al. 2001; Bisi & Kurki 2005), as well as a frequent inability of institutions that are meant to mediate such conflicts to respond effectively (Anthony et al., unpublished).

The investigation of problem animals and their control is important for a number of reasons. Firstly, attitudes towards protected areas (PAs) are often influenced by perceived or real damage caused by wildlife (Els 1995; de Boer & Baquete 1998; Hill 2004; Anthony 2007). Secondly, wildlife damage represents a very real and tangible threat to livelihoods in terms of personal injury, crop and livestock losses, and property damage (Happold 1995; Emerton 2001; Choudhury 2004; Dublin & Hoare 2004; Madden 2004; Graham et al. 2005). Thirdly, active persecution by humans based on wild predator threats to livestock has been identified as an important factor in observed carnivore declines (Mishra 1997; Woodroffe 2001; Hazzah et al. 2009). Finally, human-wildlife conflicts are potentially socially corrosive, creating and reflecting larger conflicts of value and class and other interests. Especially in poorer countries and countries in transition, such conflicts have the potential to undermine human security and further weaken the effectiveness and legitimacy of state institutions.

Despite more than a decade of active engagement between Vwaza Marsh Wildlife Reserve (VMWR) and its neighbouring communities (Figure 1), little is known about how those relationships have developed and what factors influence their success or failure in fostering cooperation. The historical background of these communities is characterised by a general dissatisfaction with reserve authorities in part due to village evictions and damage to crops and property caused by wildlife (Msiska 2002; VMWR 2003; Nxumayo et al. 2008). Further, VMWR Annual Reports (2003-2004 through 2008-2009) consistently highlight (i) problem animal incidents, and (ii) the ongoing challenges associated with problem animal control, alleviating damage, and adequately responding to communities' demand for compensation. Incidents of human-wildlife conflicts that are not adequately resolved assure the maintenance of a tense relationship between the reserve and communities, which has undesirable social consequences and poses risks for the reserve and its resources in the longer term. Developing an adequate response to problem animals should be a high priority for reserve authorities.

Although there have been extensive studies on the interrelationships between PAs and people regarding wildlife damage in other areas in Africa (Lindsay 1987; Durbin & Ralambo 1994; Emerton & Mfunda 1999; Infield & Namara 2001; Anthony 2007; Kaswamila et al. 2007; Warren et al. 2007), little is known about the dynamics of problem animals and their control along VMWR's boundary and how these influence interactions between the reserve and its neighbouring communities. This report examines institutional roles and the effectiveness of policies and practices of DNPW (VMWR) and local communities in managing human-wildlife conflict along the reserve's border, and offers perspectives from rural community members who live within the area. Finally, we propose recommendations on alleviating DCA conflicts.



**Figure 1: Location of VMWR in relation to northern Malawi and Zambia**  
(Source: Peace Parks Foundation GIS, n.d.)

## 2. METHODS

In order to explore the complexity of the problem animal issue at VMWR, especially to understand local community perspectives, we used a participatory multi-method approach (Lynam et al. 2007). This included (i) archival analysis of relevant reports, policies and legislation, (ii) semi-structured interviews, (iii) village/zone meetings, and (iv) participatory mapping exercises. Fieldwork was conducted from 29 July – 6 August 2009.

### 2.1. Archival analysis

The following documents were used as a basis for the analysis of relevant legislation, policies, and records:

- Govt. of Malawi. 2004. *National Parks and Wildlife (Amendment) Act*. No.15/2004.
- Department of National Parks & Wildlife (DNPW). N.d. *Parks and Wildlife Policy*.
- Hall-Martin, A., Nzima, H.E. Myburgh, W. and W. van Riet Jr. 2007. *Establishment and Development of Malawi-Zambia Transfrontier Conservation Areas: Nyika Transfrontier Conservation Area: Joint Management Plan*. June 2007, Peace Parks Foundation.
- Vwaza Marsh Wildlife Reserve. 2003. *Vwaza Marsh Wildlife Reserve Master Plan*.

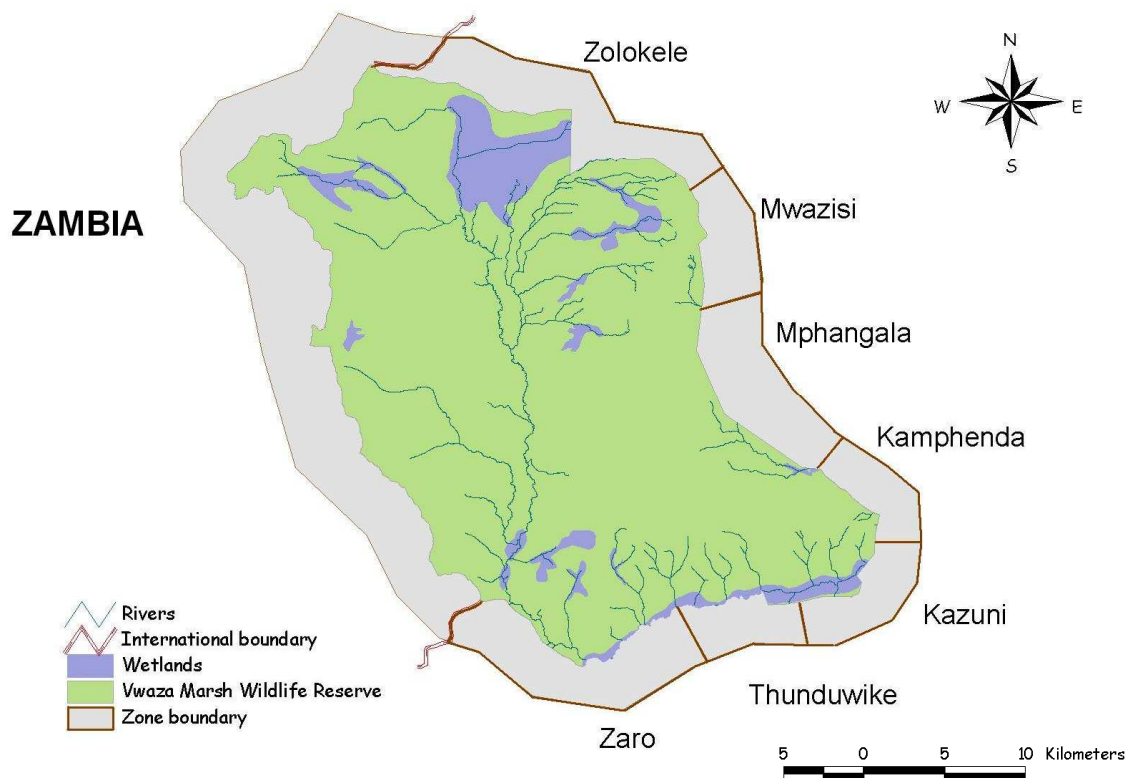
- Msiska, H.G. 2002. *Guidelines on community involvement in problem animal control with vermin animals (draft)*. February 2002. VMWR, DNPW.
- Nxumayo, G.Z., Msiska, H.G., and A. Kataya. 2008. *Reflection on the relationship between Department of National Parks & Wildlife (DNPW) and bordering communities: a case study in the border zone areas of Nyika National Park and Vwaza Marsh Wildlife Reserve in the Northern Division*. October 2008. DNPW and NVANRRD.
- Nyika-Vwaza Association for Natural Resources and Rural Development (NVANRRD). 2007. *Constitution of the Nyika / Vwaza Association*. September 2007.
- VMWR Annual Reports: 2003-2004 to 2008-2009
- VMWR Problem Animal Reports: July 2008 - July 2009
- VMWR Mammal Population Estimates: 1985 - 2008

## 2.2. Semi-structured interviews

- VMWR Park Manager, Research Officer, and Extension Officer.
- Nyika-Vwaza Association for Natural Resources and Rural Development (NVANRRD) Chairperson
- Natural Resource Committee representatives

## 2.3. Zone Meetings

The VMWR is surrounded by seven zones (Figure 2), consisting of 3 to 6 Natural Resource Committees (NRC) each, representing about 60 villages within 5 km of the reserve border. We conducted meetings with each zone (Figures 3-4), which lasted on average 2-3 hours and involved a total of approx. 300 participants, including 31 Traditional Authority representatives (Figure 5).



**Figure 2: VMWR Community Zones**



**Figure 3: Zolokele Zone meeting**



**Figure 4: Kamphenda Zone meeting**



**Figure 5: Traditional Chiefs at Kamphenda**



The zone meetings were pre-arranged by the VMWR Extension Officer, local NRC representatives and Traditional Authorities. The first part of each meeting consisted of an introduction of the participants, the meeting agenda, and the purpose(s) for which the meeting was called. Secondly, a series of open-ended questions concerning problem animals and their control (see Box 1) was asked of the meeting participants by one of the researchers [JW]. This was followed by a participatory mapping exercise.

**Box 1: Questions asked of participants during Zone meetings.**

- 1) In the past 3 years, has your village(s) ever had problems with wild animals?
- 2) If yes, what type of problem(s)?
- 3) Where do these animals come from? How do you know they come from there?
- 4) What animals are most responsible for these problems and why? Please number from one (most damaging) to five (5<sup>th</sup> most damaging). Are there others which are problematic?
- 5) How do conflicts with wild animals affect your livelihood?
- 6) If crops or livestock are destroyed, or people are attacked by wild animals, what should someone do? What usually happens when someone follows this route?
- 7) In your opinion, have problems with wild animals in your village increased or decreased in recent years? Why do you say so?
- 8) In your opinion, who is primarily responsible for wildlife in your area?
- 9) In your opinion, who should be responsible for wildlife in your area? Why do you say so?
- 10) In your opinion, what do you think should be done to reduce conflicts with wild animals?
- 11) Is the VMWR beneficial or not? Why do you say so?

#### ***2.4. Participatory Mapping***

The second phase of the meeting consisted of a participatory mapping exercise. Participatory mapping is a useful and iterative visualization method to use for assessing problem animals as it helps to define the geographical boundary of the project area and illustrate the spatial relationships of villages, landscape features and areas where problem animals occur (Figure 6). Maps produced on the ground, or using locally-available materials are easy to construct and adjust until informants are content that the information is accurate (Catley et al. 2007). Participants were instructed on the intended purpose and relevant components to be included on the map. After approx. one hour, each map was presented back to all meeting participants by 1-2 volunteers from each group. In total, 10 maps were created, as both Kamphenda and Zolokele Zone participants decided to separate their zones into smaller units to enable the construction of more detailed maps (see Appendix A).



**Figure 6: Participatory mapping exercise**

### **3. ZONE MEETING RESULTS (DISCUSSION)**

The results of the zone meetings are summarised below, and are ordered as per the list of questions in Box 1.

#### ***3.1. In the past 3 years, has your village(s) ever had problems with wild animals?***

All seven zones reported problems with wildlife in their areas within the last three years. Most zones also remarked that problems with elephants have increased over this period.

#### ***3.2. If yes, what type of problem(s)?***

All 7 zones reported problems of multiple nature (see Table 1 below). Both crop depredation and destroying food stores (mainly granaries) were identified as problems in all zones. Other major problems consisted of livestock being killed (primarily by hyena, honey badger, and serval; see Appendix B for taxonomic nomenclature), and wildlife chasing/threatening people (elephant, leopard, hyena, bushpig, buffalo). Two reports of wildlife killing people were reported: a boomslang in Mwazisi and elephants in Kazuni.

**Table 1: Types of human-wildlife conflict in zones surrounding VMWR**

Zone	crop depredation	destroying food stores	chasing / killing livestock	chasing / threatening people	killing people	other
Zolokele	✓	✓		✓		
Mwazisi	✓	✓	✓	✓	✓	
Mphangala	✓	✓	✓			
Kamphenda	✓	✓	✓	✓		
Kazuni	✓	✓	✓	✓	✓	- drinking our traditional beer
Thunduwike	✓	✓	✓	✓		- drinking our water
Zaro	✓	✓	✓	✓		-bringing tsetse flies

### 3.3. *Where do these animals come from? How do you know they come from there?*

All zones reported that problem animals primarily originate from VMWR, although it was noted that some taxa (birds, snakes, baboons/monkeys, bushpigs, and leopard) also exist outside the reserve, especially in forested areas.

Meeting participants stated that they could identify the origin of problem animals because:

- 'we see them coming from the reserve'
- 'these animals don't exist outside the reserve (e.g. roan, buffalo, elephants)'
- 'animals exit through the broken fence'
- 'we see tracks leading from the reserve'
- 'VMWR staff chase them back to the reserve'
- 'after elephants leave the reserve, they return back to it'
- 'we hear their sounds/calls coming from VMWR'
- 'a goat carcass was found in VMWR'

### 3.4. *What animals are most responsible for these problems and why? Please number from one (most damaging) to five (5<sup>th</sup> most damaging). Are there others which are problematic?*

To determine a cumulative ranking of problem animals by taxa, we assigned the following scores:

- 5 = worst problem animal
- 4 = 2<sup>nd</sup> worst problem animal

- 3 = 3<sup>rd</sup> worst problem animal
- 2 = 4<sup>th</sup> worst problem animal
- 1 = 5<sup>th</sup> worst problem animal
- 0.5 = listed among 'other' problem animals

In the event of equal scores, taxa which were identified in more zones were assigned a higher ranking.

Table 2 shows that 19 different taxa were identified by the participants as 'problem animals'. By far, elephants were perceived as the 'worst' problem animal by local communities, with a cumulative score of 33 and six of the seven zones reporting it as the most problematic species in their respective zone (Figures 7,8). Following elephants, baboons/monkeys ( $\Sigma=23$ ), hyena ( $\Sigma=15$ ), bushpigs ( $\Sigma=14.5$ ), and hippo ( $\Sigma=11$ ) were ranked in decreasing order. Fourteen other taxa were also listed as problem animals by the communities, but were ranked relatively low ( $\Sigma=0.5-3$ ). Mphangala Zone reported the highest number of problem taxa ( $n=11$ ), with the remaining zones ranging from 7-9.

Elephants, baboons/monkeys, hyena and bushpig were identified as widespread problem animals, whilst hippo were confined to the southern zones (Kazuni, Thunduwike, Zaro), buffalo to the most western zones (Zaro, Zolokele), and leopard to Mwazisi and Mphangala zones to the east of the Reserve.



**Figure 7: The 'worst' problem animal according to local communities**



**Figure 8: Elephant damage within VMWR**

Data was organized to determine the most problematic taxa, i.e. those listed as 1 of the 5 most problematic within any one zone (n=11; Figure 9). Information was also elicited from participants concerning their reasoning for ranking taxa the way they did. Table 3 summarizes these responses in terms of the types of damage caused by each taxa and/or perceptions of these animals' relationship(s) with local communities.

**Table 2: Ranking of problem animals by zones adjacent to VMWR**

Rank	Taxa	ZONE							TOTAL SCORE
		Zolokele	Mwazisi	Mphangala	Kamphenda	Kazuni	Thunduwike	Zaro	
1	Elephant	5*	3	5*	5*	5*	5*	5	<b>33</b>
2	Baboons / monkeys	3	5	4	2	4	2	3	<b>23</b>
3	Hyena	2	4	1	4	0.5	3	0.5	<b>15</b>
4	Bushpig	4*		3	3	2*	0.5	2	<b>14.5</b>
5	Hippo					3*	4*	4*	<b>11</b>
6	Honey badger	0.5	0.5	0.5	0.5		1		<b>3</b>
7	Bushbuck	0.5			1	1			<b>2.5</b>
	Porcupine	1	1				0.5		<b>2.5</b>
9	Serval			2	0.5				<b>2.5</b>
	Leopard	*	2	0.5					<b>2.5</b>
11	Buffalo	0.5*						1*	<b>1.5</b>
12	Lion			0.5				0.5	<b>1</b>
	Civet		0.5	0.5					<b>1</b>
	Francolins		0.5			0.5			<b>1</b>
15	Squirrel	0.5							<b>0.5</b>
	Raptors			0.5					<b>0.5</b>
	Monitor lizard			0.5					<b>0.5</b>
	Boomslang		0.5						<b>0.5</b>
	Guineafowl					0.5			<b>0.5</b>
<b>TOTAL (taxa/zone)</b>		<b>9</b>	<b>9</b>	<b>11</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>7</b>	

\* = complemented by VMWR Problem Animal reports (07/2008-07/2009)

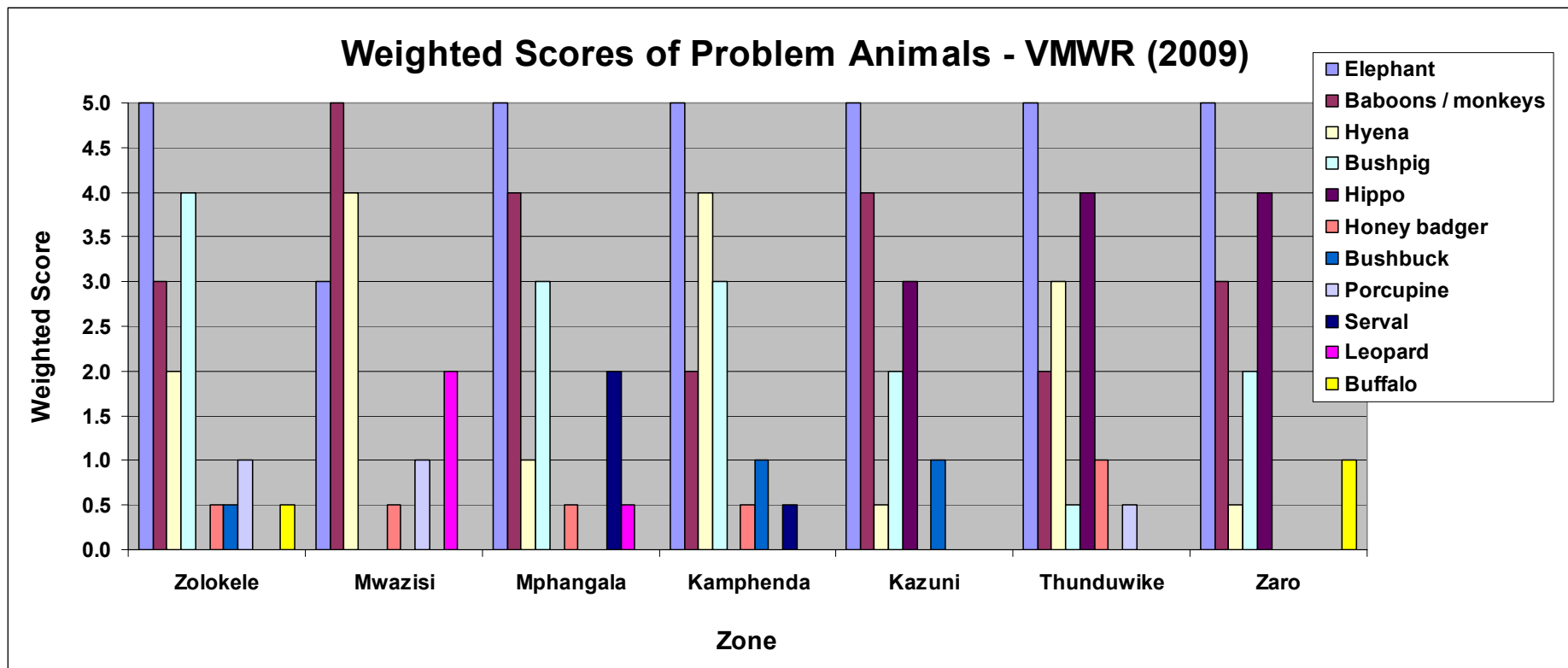


Figure 9: Ranking of various problematic taxa and their distribution by Zone.

**Table 3: Reasons given for ranking particular taxa by meeting participants**

		Reasons for Ranking / Types of Damage						
Rank	Taxa	Crops	Livestock	People	Infrastructure	Temporal Aspects	Spatial Aspects	Other
1	Elephant	-maize* -banana* -cassava* -sweet potato		-chases people -threaten people -kill people (e.g. in 2007)	-destroy houses -destroy granaries -drinks our water	-year-round problem -high frequency of incidents -problem during dry season -lots of damage in short time -comes at night	-eats & destroys wide area with its feet -close to village	-difficult to chase back to reserve and continue depredation -cannot chase them as they're bigger -elephants feel 'superior' -doesn't fear people -we have no measures to control them
2	Baboons / monkeys	-maize -cassava -banana	-chickens			-eats maize seed at sowing, when they flower, and when mature -year-round problem -come during daytime -come frequently (even hourly)	-they come from both reserve and from hills outside -widespread damage	-bring tsetse flies -very clever in their tactics -interact closer with people -come in large numbers -requires a lot of work to guard the gardens -difficult to chase away, so they stay around the village -baboons are like humans >> they return after they're chased away -don't fear women
3	Hyena		-chickens -goats -sheep -dogs	-threatens people -can bite		-damage is done quickly -year-round problem -destroys at night		-like its 'supernatural'
4	Bushpig	-maize* -sweet potato -cassava		-bites people		-come at night and we wake up to damage -problematic during rainy season		-can get across full rivers to get at crops -'knows' when to come when people are absent (clever) -travel in groups and causes lots of damage
5	Hippo	-maize* -cassava -tramples tobacco nurseries*		-may kill people		-problematic during rainy season -come at night and year-round	-eats a lot	-large animal
6	Honey badger		-chickens -ducks -pigeons	-chases people	-destroys beehives and eats honey	-comes at night and year-round		-targets genitalia when chasing people
7	Bushbuck	-millet -beans -sweet potato -tomato				-problematic during dry season		



Table 3... cont'd

Rank	Taxa	Crops	Livestock	People	Infrastructure	Temporal Aspects	Spatial Aspects	Other
7	Porcupine	-cassava -maize -sweet potato				-‘continuously’ destroys -year-round problem	-especially near reserve border	
9	Serval		-chickens					
	Leopard			-can kill people		-year-round problem	-found close to people and in between villages -lives outside VMWR	
11	Buffalo	-beans		-kills people				-behaves like people - you can follow its tracks and find it has gone in a big circle
12	Lion		-cattle (seen in 1993 & 2003)					
	Civet		-chickens					
	Francolins	-eats seeds after planting				-eats seeds after planting -problematic during rainy season		
15	Squirrel	-maize, even in gardens						
	Raptors		-chickens					
	Monitor lizard		-chickens					
	Boomslang			-killed someone last year -chases people				
	Guineafowl					-problematic during rainy season		

\* = complemented by VMWR Problem Animal reports (07/2008-07/2009)

### 3.5. How do conflicts with wild animals affect your livelihood?

Meeting participants were adamant in voicing their concerns over the widespread destruction of both crops and livestock in the area by problem animals. Reported effects on livelihoods included:

- decreased revenue from crop damage;
- increased risk of starvation as there is no food and no income;
- making it difficult to raise orphans; and
- residue from crops is not returned to soil as fertiliser when crops are eaten.

Estimated extents of losses were provided by community participants from each zone and reflect the wide variability in responses even within individual areas (Table 4). As no records were available to confirm these estimates, these values should be treated as gross estimates only.

**Table 4: Extent of households affected by problem animals per Zone**

Zone	Reported losses
Zolokele	- 64/900 (7.1%) households reported incidents in one village - 80 households in another village
Mwazisi	- 50% of households affected - 50-80% destruction in affected households
Mphangala	- ~70% of households affected - ~ 70% of household crops affected
Kamphenda	- 70% crop loss - in one day, elephants can affect up to 60 households
Kazuni	- 80% of households affected - 50-70% damage in affected households
Thunduwike	- 75% of households affected - Close to 100% of gardens destroyed (50 elephants in one night)
Zaro	- 14/300 (4.7%) households affected in one NRC - 70% of households affected in another village - 70-90% of destruction of crops when damage occurs

### 3.6. If crops or livestock are destroyed, or people are attacked by wild animals, what should someone do? What usually happens when someone follows this route?

By and large, most community members contact the VMWR scouts or extension workers if they encounter problem animals (Table 5). However, in some cases, community members will use traditional methods of scaring animals away (beating drums, lighting fires, etc.), with limited success. Overall, community members feel that responses from VMWR staff are varied: sometimes they respond immediately; at other times, the response is too slow. Finally, frustration over lack of compensation for damage was expressed by a number of participants.

**Table 5: Community perceptions on protocol concerning PA reporting**

Zone	Protocol	Result
Zolokele	contact VMWR scout	<ul style="list-style-type: none"> <li>- Immediately responded</li> <li>- Sometimes don't come</li> <li>- No compensation!</li> </ul>
	Contact scouts > contacts chief > contacts District Commission > contacts Central Office in Lilongwe	<ul style="list-style-type: none"> <li>- Nothing; people even wanted to beat chiefs because nothing was done</li> </ul>
Mwazisi	If elephant or buffalo, contact extension worker	<ul style="list-style-type: none"> <li>- Immediately come</li> <li>- Don't drive them back far enough into reserve</li> <li>- No assistance</li> <li>- Shoot in air</li> <li>- No compensation for damage</li> </ul>
	If monkeys or baboons, we deal with them ourselves	<ul style="list-style-type: none"> <li>- They come back</li> </ul>
	If snakes, we run	
Mphangala	Beat drums, then contact extension worker who shoots in air	<ul style="list-style-type: none"> <li>- Elephants leave, but don't go far</li> </ul>
	Set fires	<ul style="list-style-type: none"> <li>- Elephants leave, but don't go far</li> </ul>
	Historically, chief called reserve who shot 1 elephant	<ul style="list-style-type: none"> <li>- Elephants smelled dead elephant and didn't return</li> </ul>
Kamphenda	Contact extension worker	<ul style="list-style-type: none"> <li>- Sometimes don't respond</li> <li>- Its time-consuming as extension worker sometimes needs to contact Kazuni office</li> </ul>
	Beat drums to chase animals away	<ul style="list-style-type: none"> <li>- Animals leave, but don't go far</li> </ul>
	Set fires near reserve border	<ul style="list-style-type: none"> <li>- Animals leave, but don't go far</li> </ul>
	Do nothing: lock ourselves in our houses due to fear	
Kazuni	Contact VMWR	<ul style="list-style-type: none"> <li>- Respond immediately</li> <li>- Multiple incidents at once means some problems not attended to</li> </ul>
	While waiting for VMWR, beat drums and make noise (even with our children)	<ul style="list-style-type: none"> <li>- Animals have habituated to these methods</li> </ul>
Thunduwike	Contact VMWR Kazuni office	<ul style="list-style-type: none"> <li>- Receive information; no assistance; reserve just reports information to DNPW headquarters</li> <li>- No compensation for damage</li> <li>- Sometimes scouts come to drive animals back</li> </ul>
	Nothing due to fear	
Zaro	Contact extension worker	<ul style="list-style-type: none"> <li>- Immediately come</li> <li>- Don't come (or delay) and only offer condolences</li> <li>- Often come and chase away, but animals return</li> <li>- No compensation</li> <li>- Come and only shoot in air and don't kill</li> </ul>
	Beat drums	<ul style="list-style-type: none"> <li>- Elephants leave, but don't go far</li> </ul>

**3.7. In your opinion, have problems with wild animals in your village increased or decreased in recent years? Why do you say so?**

All participants believe that incidents with problem animals have been increasing in recent years, particularly with elephants (Table 6). Their reasons for saying so are based on problems with the Reserve border fence, increasing animal populations, insufficient buffer zone between Reserve and communities, and poor control of problem animals.

**Table 6: Community perceptions concerning PA trends**

<b>Zone</b>	<b>Perception of trend</b>	<b>Justification for perception</b>
Zolokele	problems increasing	- elephants are breaking out more frequently recently, although 'animals are fewer'
Mwazisi	problems increasing	- never used to be elephant problems until last year - animal populations are increasing - communities don't have guns to drive animals back (used to kill one animal at a time)
Mphangala	problems increasing	- increased frequency of elephants at the same time, but only 1 extension worker, therefore, he cannot effectively control animals in more than one spot. - reserve boundary and village are very close to each other, and is getting closer. - animal populations are increasing and they're not being killed. - there's no barrier between the people and the reserve. - there was no consideration of people's interests when the reserve was established under Banda's regime.
Kamphenda	problems increasing	- no fence - more animals now
Kazuni	problems increasing	- animal populations are increasing - fence is vandalised
Thunduwike	problems increasing	- animal populations increasing in reserve - no collaboration between DNPW and villages in terms of fenceline relationship - no electricity in fence - DNPW favors animals over people, especially the law enforcement scouts inside
Zaro	problems increasing	- there are more animals now - fence is now broken and electrification doesn't work - extension workers are too friendly with communities but ineffective at fixing or maintaining fence - VMWR took over some of the villages' land - fence has been vandalised

**3.8. In your opinion, who is primarily responsible for wildlife in your area?**

**3.9. In your opinion, who should be responsible for wildlife in your area? Why do you say so?**

Most communities believe that VMWR are responsible for problem animals, with some collaboration with communities. Most, however, would like to see communities gain more responsibility over wildlife in their areas, in part to (i) increase financial benefits to communities, (ii) improve effectiveness of problem animal control, and (iii) recognise land tenure claims (Table 7).

**Table 7: Community perceptions on institutional roles and responsibilities concerning problem animal control**

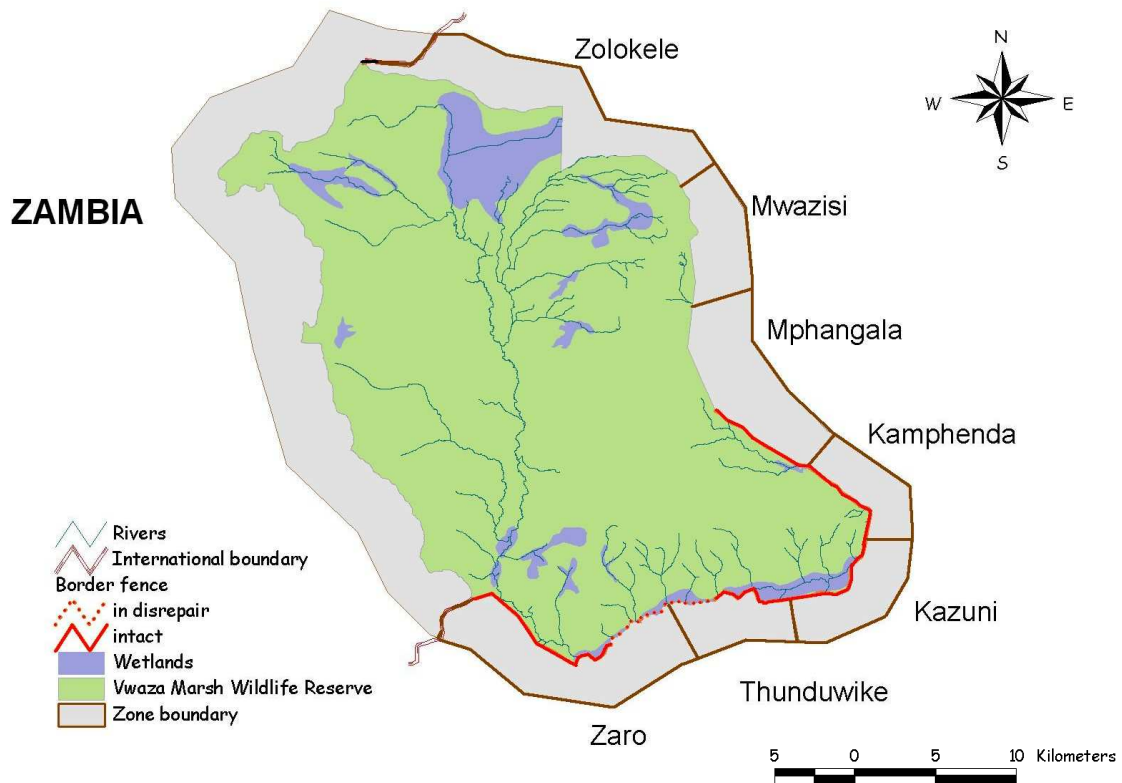
Zone	Who <u>is</u> responsible	Who <u>should be</u> responsible	Reasons
Zolokele	VMWR (majority) + community (minority): central government doesn't assist communities, only VMWR, to deal with problem animals	communities	<ul style="list-style-type: none"> <li>- Banda government made reserve boundaries without consulting communities, with some villages evicted from reserve</li> <li>- Because animals are living with us</li> </ul>
Mwazisi	communities (to report) + VMWR (to respond)	communities (to report) + VMWR (to respond)	<ul style="list-style-type: none"> <li>- Should find way to be more effectively handled</li> <li>- Government is receiving revenue from VMWR, therefore communities should work hand-in-hand with VMWR</li> <li>- Would allow our children to see animals</li> </ul>
Mphangala	VMWR	communities	<ul style="list-style-type: none"> <li>- God has given wildlife to communities</li> <li>- historically, one animal was killed and others never came out. Now, animals are not allowed to be killed and animals are increasing.</li> </ul>
Kamphenda	communities	Extension worker	- they represent reserve and have weapons
		Extension worker + communities	- the animals are for all of us and we need to build co-operation.
Kazuni	VMWR + communities	communities	<ul style="list-style-type: none"> <li>- Government should be more concerned about this problem as this 'is our land' and the VMWR staff are 'only employees'</li> <li>- Government should increase awareness so communities would increase their appreciation of the reserve.</li> </ul>
Thunduwike	- communities (reserve just took it from us in past)	communities	<ul style="list-style-type: none"> <li>- Its our land and resources</li> <li>- Wildlife is in our gardens and we're Malawians</li> </ul>
Zaro	communities + extension workers/VMWR	communities	<ul style="list-style-type: none"> <li>- Because it brings tourists who bring money</li> <li>- The area is theirs, therefore, money should go to communities</li> <li>- Because animals are to be conserved for their future generations</li> <li>- VMWR used to be theirs, so they should still have the responsibility</li> </ul>

**3.10. In your opinion, what do you think should be done to reduce conflicts with wild animals?**

A wide variety of suggestions were made by participants concerning mitigating conflicts with problem animals. We classify these into five broad categories, namely (1) fence / VMWR boundary, (2) staffing, (3) benefit sharing, (4) community involvement, and (5) wildlife management. Specific suggestions are listed within these categories below (n= number of zones where item suggested).

**Fencing / VMWR boundary (see also Figure 10)**

- Improve fence, either with better construction and/or electrification (n=7)
- Move fence boundary further into VMWR (n=5)
- Eliminate fence altogether (n=2)
- Create 500m buffer zone (n=1)



**Figure 10: Extent and condition of fence along VMWR border**  
(as indicated by VMWR staff)

**Staffing**

- Increase VMWR extension workers (n=5)
- Increase VMWR posts along fence (n=2)

**Benefit sharing**

- Introduce damage compensation scheme (n=2)
- Provide livestock assistance (e.g. goats, poultry, guinea fowl) (n=2)
- Provide microloans (n=1)
- Provide relief (e.g. fertiliser) (n=1)

### Community Involvement

- Build community involvement & participation (n=4)
- Train and arm community members to guard fence (n=2)

### Wildlife Management

- VMWR should create artificial waterholes in reserve (n=2)
- VMWR should reduce animal populations (n=1)

### 3.11. Is the VMWR beneficial or not? Why do you say so?

Opinions of community members as to whether the VMWR was beneficial or not were varied, with a wide range of positive, neutral and negative responses (Table 8). Responses were positive with respect to perception of VMWR as a source of income from tourism, employment, and natural resources which benefit local livelihoods. Strongly negative responses related to costs of problem animals, and lack of benefits from the VMWR, both in financial and development terms. Neutral responses were most prevalent concerning opinions of VMWR being beneficial but lacking in terms of development benefits for communities, unqualified staff, and as a source of tsetse flies.

**Table 8: Overall community perceptions of VMWR**

Positive	Dichotomous	Negative
<ul style="list-style-type: none"> <li>• it's a source of income for the country (tourism)</li> <li>• it brings tourists</li> <li>• it provides employment</li> <li>• trees and game can be used for traditional medicine</li> <li>• it provides thatch grass and mushrooms</li> <li>• it provides fish during open season</li> <li>• mushrooms</li> <li>• medicine</li> <li>• bees</li> <li>• thatch grass</li> <li>• flying insects</li> <li>• it conserves animals in Malawi that don't exist in other countries</li> <li>• it increases rainfall</li> <li>• it's beautiful</li> </ul>	<ul style="list-style-type: none"> <li>• VMWR's relationship with communities is a duel: communities see benefit of reserve and animals, but receive no revenues from it (e.g. no employment, no development).</li> <li>• Beneficial as it brings rain, and children can see animals BUT game scouts are unfriendly to people and may shoot them.</li> <li>• Beneficial BUT brings tsetse flies.</li> <li>• Beneficial BUT extension workers need more training as they focus on local people and are too scared to go after Zambian poachers.</li> </ul>	<ul style="list-style-type: none"> <li>• VMWR are arresting people, but have no identification.</li> <li>• Development is misdirected – those community members who preserve animals are not helped</li> <li>• Tourists bring money, but communities receive none of it</li> <li>• There was higher animal diversity in past (zebras, bigger elephants, etc.): now, they've all run to Zambia</li> <li>• animals are eating our crops and killing people</li> <li>• we were promised development projects (e.g. boreholes) but nothing materialised</li> <li>• We cannot collect fuelwood in the reserve</li> <li>• Fence has no power</li> <li>• No compensation is given for damage</li> <li>• Roads are in very bad shape and reserve revenue is not directed towards their improvement</li> <li>• When the 'Border Zone Project' was undertaken, we received maize, fertilisers, seed, and schools, but now we receive nothing.</li> <li>• benefits should be directed to the household level, not just by building public schools, etc.</li> <li>• When the 'Border Zone Project' was undertaken, we received maize, fertilisers, and money, but now we receive nothing as we don't see VN Assoc. projects.</li> </ul>

## **4. ZONE MEETING RESULTS (PARTICIPATORY MAPPING)**

**(Note: see also Appendix A)**

### **Zolokele 1**

- most problem animals are concentrated within 2 km of Reserve border
- elephants observed up to 4 km from Reserve border, especially close to Zambian border

### **Zolokele 2**

- most problem animals are concentrated within 1 km of the Reserve boundary
- elephant and hyena venture further into zone area

### **Zolokele 3**

- most problem animals are concentrated within 500 m of the Reserve boundary
- elephant, bushbuck, porcupine & baboon also found adjacent to marsh areas

### **Mwazisi**

- monkey, elephant and leopard are widespread (up to 4 km from VMWR), but concentrated closer to boundary, and along periphery of human settlements (north, east)

### **Mphangala**

- elephants and monkeys are distributed up to 1 km from Reserve boundary, but more concentrated within 200 m.
- problem animals are observed even within village areas.

### **Kamphenda 1**

- hyena widespread across zone
- elephant concentrated in western area
- baboons/monkeys concentrated in highlands
- north-west area of zone adjacent to Reserve is most affected (baboons/monkeys, elephant, bushpig, hyena)

### **Kamphenda 2**

- hyena, elephant, baboon concentrated within 2.5 km of Reserve boundary
- bushpig concentrated within 1 km of Reserve boundary

### **Kazuni**

- elephants, bushpigs and baboons found up to 3 km from Reserve boundary, but more concentrated in southern part of Zone and closer (<1.5 km) to Reserve (elephant, baboon, hippo, hyena, bushpig).

### **Thunduwike**

- baboons & monkeys widespread, but especially among hills
- elephant found up to 2 km from Reserve boundary
- hippo concentrated within 500 m of Reserve
- hyena only in eastern part of zone

### **Zaro**

- 2 lion have been sighted in zone
- elephant, bushpig, hippo and monkeys up to 2 km from Reserve boundary, but more concentrated within 500 m.



## 5. DISCUSSION & RECOMMENDATIONS

The acute problem of problem animals, their control, and the need for compensation identified in our study demands a solution if improved relationships between VMWR and its neighbors are desired. Fostering communication and trust, demonstrating effort and a willingness to address the issue, and following through can have a positive effect on the attitudes and actions of people in conflict with wildlife (Madden 2004). However, with such a complex issue, including the range of socio-economic and ecological factors that can influence tolerance to wildlife (Table 9), one cannot rely on any one solution alone but is more likely to succeed if it employs a battery of flexible instruments and policies. In addition, systematic and effective reporting and monitoring, record keeping, and quick responses are required to ensure the human-wildlife conflict is being tracked, comprehended, and sufficiently addressed. Appropriate new, existing, or traditional systems and institutions need to be developed or empowered locally, and be evidence-based to ensure good management (Madden 2004; Thirgood & Redpath 2008) .

**Table 9: Factors influencing local tolerance to wildlife pests**

Note: Those applicable to elephants are in bold (Source: Hoare 2001b)

<<< INCREASING <<< TOLERANCE		INCREASING>>> INTOLERANCE >>>	
<b>SOCIO-ECONOMIC FACTORS</b>			
Abundant	Land availability		Scarce
Abundant, inexpensive	Labour availability		Rare, expensive
Low	Capital and labour investment		High
Various	Alternative income sources		None
Varied, unregulated	Coping strategies		Narrow, regulated
Small	Size of discussion group		Large
<b>Subsistence</b>	Type of crop damaged		<b>Cash or famine crop</b>
Community, group	Social unit absorbing loss		<b>Individual, household</b>
Low	Potential danger of pest		<b>High</b>
High	Game value of pest		<b>Low</b>
<b>ECOLOGICAL FACTORS</b>			
Small	Pest size		<b>Large</b>
Early	Raid timing relative to harvest		<b>Late</b>
Solitary	Pest group size		<b>Large</b>
Cryptic	Damage pattern		<b>Obvious</b>
Narrow, one crop	Pest's crop preference		<b>Any crop</b>
Leaves only	Crop parts damaged		<b>Fruit, tuber, grain, pith</b>
Diurnal	Circadian timing of raids		<b>Nocturnal</b>
Self-limited	Crop damage per raid		<b>Unlimited</b>
Rare	Frequency of raiding		<b>Chronic</b>
<<< INCREASING <<< TOLERANCE		INCREASING>>> INTOLERANCE >>>	

The following discussion and recommendations are intended to guide steps towards alleviating the conflict between local communities, problem animals, and the VMWR. These include institutional adjustments, information and reporting, problem animal control options, and a compensation scheme framework. Finally, we identify areas where further research would be beneficial.

### **5.1. Institutional arrangements**

Human-wildlife conflict is highly variable and there is no single management option or solution that can successfully deal with the problem. In all cases, including that of the VMWR, a combination of options is needed. However, to be sustainable, such options should match the financial and technical capabilities of local institutions, communities and the individuals responsible for its implementation. The options available will partly be determined by the institutional arrangements or policies found at the national, regional and local level. In Malawi, these policies are guided primarily by the **National Parks and Wildlife (Amendment) Act, 2004**. Specific provisions within this Act which concern problem animals and their control are shown in Box 2 below.

#### **Box 2: Relevant provisions in NPWA 2004 concerning problem animals and their control.**

3. (1) The purposes of this Act are -
- c) the sustainable use of wildlife and minimization of conflict between human beings and animals;
  - d) the control of dangerous vertebrate species;
  - g) the promotion of local community participation and private sector involvement in conservation and management of wildlife
73. The purposes of this Part are -
- a) to authorize the killing without licence of protected animals under circumstances where human life or property is threatened by the animals which circumstances are defined in sections 79 and 80;
74. Any person may kill or attempt to kill any protected animal in defence of himself or of another person or any property, crop or domestic animal if immediately and absolutely necessary:
75. Any person may attempt to kill or kill any protected animal which is causing material damage to any land, crop, domestic animal, building, equipment or other property of which the person is either the owner or the servant of the owner acting on his behalf in safeguarding the property.
77. (1) Subject to this Act, any person having reason to believe that any protected animal is causing or is about to cause material damage to any land, crop, domestic animal, building, equipment or other property may report the facts to an officer.
- (2) An officer who receives a report pursuant to subsection (1) shall, as soon as practicable, assess the extent of the threat posed by the said animal and take any necessary action he considers fit in the circumstances.
- (3) In deciding what action should be taken to minimize damage to property caused by a protected animal, an officer shall carefully consider the status of the species and if he decides to kill or attempts to kill the animal, he shall do so only as a last resort and only if he has reasonable ground for believing that this course of action will not endanger survival of the species.
81. (1) If any dangerous animal is believed to be threatening or about to threaten human life or property, any person may request any officer for assistance in minimizing or preventing the threat.
- (2) Where an officer received a request pursuant to subsection (1) he shall, as soon as practicable, take steps to minimize or prevent the threat, and such steps may include the killing of the animal:
84. Nothing in this part shall be construed as prohibiting the use of repellent substances or devices which are not capable of killing or injuring any protected or game animal by a property owner or his servant for the purpose of repelling any wild animal from his property.
104. Without derogation from the generality of section 103, the Fund [National Parks and Wildlife Fund], may be applied to -
- c) the cost of any scheme which the Minister considers to be in the interest of the management of protected areas;
  - e) any purpose which the Minister considers to be in the interest of the objects of the Fund.

Guided by national legislation and policy, the **Vwaza Marsh Wildlife Reserve Master Plan 2003** also makes provision and details roles and responsibilities for institutions and individuals for problem animal incidents and their control (see Box 3).

**Box 3: Relevant sections of WMWR Master Plan 2003 concerning problem animals and their control.**

**1.12. Collaborative Management**

The Collaborative Management Programme in Malawi was first formulated in the early 1990s. Its aim is to develop a sustainable and inter-dependent relationship between protected areas and the rural populations surrounding these by ensuring the direct flow of benefits to these communities. Malawi's initiative differs significantly from those implemented in other countries in the region. Compared to other southern and eastern African countries Malawi has a high human population density and there are no Buffer Zones surrounding protected areas. As a result there is no gradual change from human population centres to wildlife habitat, instead villages occur right up to the protected area boundaries and conflict between these two is often high. In addition, natural resources on which rural communities are still to a large extent dependent are becoming increasingly scarce outside protected areas. In response to this situation DNPW has from the early to mid 1990s on permitted limited use of certain park resources within a defined area as part of its Resource Use Programme.

**1.12.2. The Border Zone**

The successful implementation of the Collaborative Management Programme requires that the intended target population of the programme be clearly defined. The benefits which can be accrued to communities by the reserve are not unlimited and thus the number of people who can participate in the programme should be defined to allow for maximum impact of the programme. The target group of the programme are the communities living within 5 km (map distance) of the VMWR boundary on the Malawian side. There are a number of reasons for this criterion. Foremost, those people living in close proximity of the reserve are the ones most affected by the reserve e.g. crop damage by wild animals and livestock depredation.

**2.1.2.2. Collaborative Management**

The Parks and Wildlife Policy defines a new institutional framework for the wildlife sector in which the Department of National Parks and Wildlife acts as the focal point and seeks support for wildlife conservation from individuals and organisations from all segments of Malawian society and the international community. In order to promote collaborative management of wildlife for conservation and sustainable development the Department will:

- be responsible for problem animal control;

The Department of National Parks and Wildlife in conjunction with communities, NGOs and the private sector will;

- reduce the detrimental effects of wildlife on human life through appropriate measures;

**2.3.5. Problem Animal Control**

Crop protection methods currently employed do not provide effective service to border zone communities. Problem Animal Control Unit staff are unable to respond to requests for assistance due to the distances involved and inadequate financial resources. Problem species are mainly baboons, monkeys and bush pigs. Elephant and hippo are sometimes a problem for communities along the southern boundary. The solar powered electrified fences on the eastern and southern boundary of the reserve are in a good state of repair.

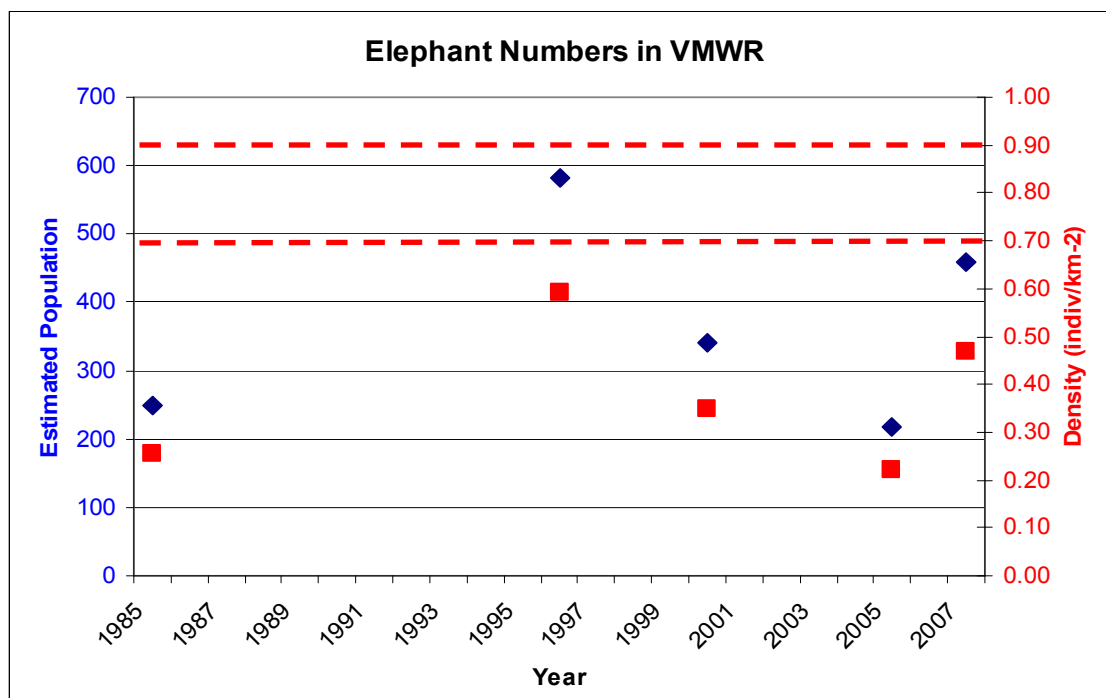
**[but see section 3.10 and Figure 10 of this report]**

**3.1.4.3. Problem Animal Control**

Problem animal control scouts located at different points throughout the Northern Region perform this function. Currently some scouts falling under the control of Park Management have been trained to provide improved services to villages adjacent to the reserve.

Further, according to the VMWR Master Plan (2003), Section 2.2.2., woodlands should be managed so that, '*Elephant is the key species and the initial aim is to protect the population so that it achieves a density of approximately 0.8/km<sup>2</sup>, and thereafter to maintain it within plus or minus 0.1/km<sup>2</sup> of this density.*' However, it is not clear from the Master Plan whether

the preferred  $0.8/\text{km}^2$  is meant as an overall density within the Reserve, or simply within suitable habitat. This should be clarified as management decisions will differ greatly, depending on this value. Based on figures provided by VMWR staff, elephant density is presently estimated at approximately  $0.47/\text{km}^2$  (Figure 11) and may be less depending on movement between Vwaza and Lundazi Forest in Zambia. This is still well below the threshold of  $2.0/\text{km}^2$  identified by Holdo (2007), above which a likely decline in woody vegetation would be evident in Miombo woodland.



**Figure 11: Estimated population (blue) and density (red) of elephants in VMWR (1985-2007).**

Note: Red dashed lines represent preferred range of elephant density according to VMWR Master Plan (2003).

Within a wider context, VMWR is also part of the Nyika Transfrontier Conservation Area (TFCA) which, as defined by the MoU, consists of seven components covering a total area of about  $19,280 \text{ km}^2$  (see also Figure 12).

The individual components of the Nyika TFCA are:

Nyika National Park	(Malawi)	3200 km <sup>2</sup>
Nyika National Park	(Zambia)	106 km <sup>2</sup>
Lundazi FR	(Zambia)	839 km <sup>2</sup>
Mitengi FR	(Zambia)	186 km <sup>2</sup>
Mikuti FR	(Zambia)	388 km <sup>2</sup>
Vwaza Marsh WR	(Malawi)	982 km <sup>2</sup>
Musalangu GMA	(Zambia)	13,579 km <sup>2</sup>
<b>TOTAL</b>		<b>19,280 km<sup>2</sup></b>



**Box 4: Relevant sections within Nyika TFCA Management Plan concerning problem animals and their control at VMWR**

**FENCES**

Experience shows that where the boundaries of protected areas abut onto settlements and cultivation, especially in a densely populated country like Malawi, then human/wildlife conflict is inevitable. This is especially the case with species like elephants, hippopotamus, baboons and bushpigs –all four of these species occur in the Vwaza Marsh WR. The alignment of boundaries, as with the South Rukuru River and floodplain forming the southern boundary of Vwaza Marsh, with an inadequate buffer zone between prime wildlife habitat in the park, and cultivation outside, complicates the issue enormously. As these circumstances characterize all protected areas in Malawi the DNPW has been dealing with these problems for a long time, and came to the realization almost two decades ago that fencing providing the only long term solution. There is, therefore, an electrified fence along the southern boundary (30 km) and part of the eastern boundary (9 km) of Vwaza Marsh WR. Electrified fencing, however, requires ongoing maintenance, and where this fails, then the fence exacerbates the problems, rather than resolves them.

**Recommendations**

Fences are sometimes seen as being counter to the vision of a totally natural area conserved for posterity. However, there are circumstances where fences should be seen as an aid to management, and a means of building local community support through resolving and preventing human/animal conflict.

- 1) Game fences are acceptable as a means of defining boundaries, and preventing the unwanted movement of animals out of the TFCA protected areas into settled community areas...
- 8) The placement of boundary fences should always be preceded by consultations with, and sensitization of, neighbouring communities.
- 9) Fences are a prime example of a conservation action that can be used to provide benefits to local communities chiefly through employment during the construction phase, and during their ongoing maintenance.

It is evident that legislation and policies are in place at both the national and local Reserve level concerning the control of problem animals. Yet, as supported by both the VMWR Master Plan 2003 and our village meetings, the implementation of these policies is weak on the ground. The perceived result is that incidents with problem animals have increased in recent years, the response time by VMWR staff are variable, and the results of animal control is largely inadequate, often with animals habituating to the methods used (see Table 5). This has had profound consequences on local livelihoods, both directly and indirectly, including the following financial, social and cultural losses:

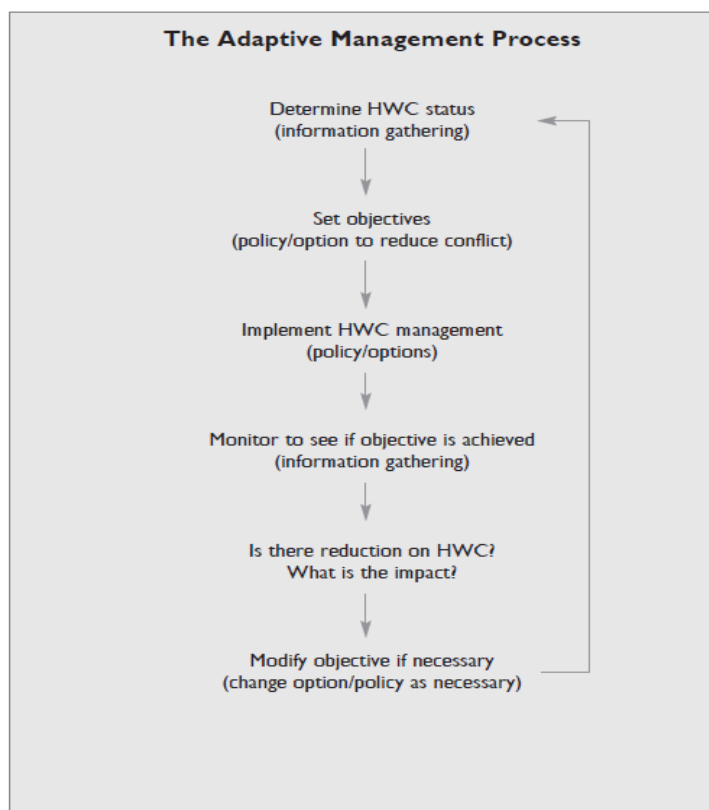
- Raiding and destruction of food crops;
- Loss of income from sales of produce from cash crops;
- Loss of natural fertilizer in crop residues.
- Damage to water sources and installations;
- Damage to stored produce;
- Damage to property (granaries, etc);
- Loss of livestock;
- Human injury or death;
- Increased anxiety and worry.

These losses also undermine the effectiveness and legitimacy of the VMWR in the eyes of local communities. In what could be described as an already strained relationship, in part due to past grievances of village evictions and unfulfilled promises of development, communities in the area are increasingly concerned about the Reserve's inability to adequately deal with problem animals.

According to participants at our Zone meetings, and supported by the VMWR Master Plan 2003, *we suggest increased involvement of local communities in both the reporting and control of problem animals* (see Sections 3.10. and 3.11.). Recognising the capacity constraints of the VMWR, both in terms of finances and expertise, increasing ‘Collaborative Management’ identified in the Master Plan may serve both conservation interests and improve institutional legitimacy in the long term. Understandably, this process should be undertaken carefully, with a clear definition of the roles and responsibilities of the parties involved.

## 5.2. Information & reporting

The previous section stressed the importance of the availability of working policies and the development of good relationships between the VMWR and local communities. Both the design and implementation of such policies are dependent on the availability of *current, accurate, and long term* information on the problem. Furthermore, good quality information will greatly assist in making correct decisions on the best action to take in reducing human-wildlife conflict. In the absence of good information, the scale and nature of human-wildlife conflict becomes a matter of personal opinion, as was evidenced in disagreements in the extent of damage during our zone meetings (see Section 3.5.). Conflict between people and wildlife is an emotional issue and, as a result, reports and opinions can be biased, creating a false impression of the size of the problem. The systematic and objective gathering of information allows stakeholders to put the problems and threats caused by human-wildlife conflict into context and perspective with other problems faced by local communities. It also ensures that resources are correctly directed, that is, at solving the real issues rather than the perceived problems. In addition, *we recommend that information gathering and reporting be embedded within an adaptive management process* (Figure 13).



**Figure 13: The adaptive management process for human-wildlife conflict (HWC)**

Up until recently, the reporting of problem animal incidents by VMWR staff was haphazard and unsystematic. According to the VMWR Research Officer, this system has now been improved and streamlined, utilizing more sophisticated and comprehensive reporting tools. We believe this should help to increase the quality of the information on which decisions can be based.

Currently, the following variables are assessed within the new reporting system by VMWR staff:

1. District (Rumphi, Mzimba)
2. Location (village)
3. Conflict type (crop, livestock, etc.)
4. Conflict description (minor, serious)
5. Species (elephant, hippo, etc.)
6. Action taken (drove into reserve, killed, etc.)
7. Result of action taken (successful, not successful)
8. Remarks (absence/presence of damage, crop type damaged, etc.)
9. Date

In order to better understand the extent of damage and to make more informed decisions concerning the dynamics of incidents (and awarding compensation, if a scheme is implemented), *in addition to the above variables, we advocate that the following information also be collected:*

- Who suffered the damage (if known);
- More detailed and quantitative assessment of damage (m<sup>2</sup>, ha, number of livestock, etc.);
- GPS or map coordinates (can be easily provided);
- Where possible, the age, sex and group size of the animals responsible.

In the light of the adaptive management approach (Figure 12), any reporting must be embedded within a larger strategy to analyse the data collected, including the extent of conflicts in the area, both spatially and temporally. Here, *we also suggest that VMWR consider using the 'Event Book System' (Stuart-Hill et al. 2005).*

**[file provided]**

### **5.3. Control options**

This section is meant to provide support for local institutions and communities to decide how to minimise human-wildlife conflict, particularly (but not only) human-elephant conflict, in the VMWR area. Here we outline a number of options that have been used elsewhere, and indicate their range of effectiveness. It is widely recommended that in addition to strategic land use planning, a suite of options be locally developed and tested in parallel, as no one tool has been found to be effective in isolation. *We purposely do not prescribe actual management decisions, as the feasibility of management options depends on a number of factors that can only be negotiated and managed between the relevant institutions.* Nevertheless, we do hope that the information provided below will assist in the decision-making process.

*Land use planning* is a long-term method for helping to reduce human-wildlife conflict, and attempts to address the conflict at its root. Land use planning is an ecosystem-based tool that can link the environment, the community, and the economy in ways that help ensure the sustainability of resources. It is the process communities use to identify appropriate and compatible uses for land within their jurisdictions. It is therefore a large scale and a long-term



method aimed at creating space for people and wildlife to live together. It is fundamental for sound wildlife management, but it must be recognized that land use planning and any changes in land use that are agreed can take several years to negotiate and implement. Land use planning might achieve some or all of the following:

- Limiting the encroachment of human settlements in wildlife areas;
- Relocation of agricultural activities out of wildlife areas;
- Consolidation of human settlement patterns that are near wildlife areas;
- Creation of secure key areas of habitat, such as routes or corridors that will permit wildlife to move freely, e.g. Gokwe, North, Zimbabwe;
- Securing separate water points for wildlife. The distribution of wildlife populations can be manipulated by changing the location of water points and providing salt licks at strategic sites;
- Repositioning the boundaries of protected areas;
- Reduction in the size of crop fields;
- Changes in location of crop fields, e.g. dwellings and fields in proximity;
- Changing cropping regimes, e.g. growing crops not palatable to elephants; diversify into other types of crops; using intercropping layouts for crops; changing timing of harvests.

Involvement in land use planning is typically a long term process that requires government support, often legislative and/or policy changes, and can be extremely expensive to implement. Modifying the spatial distribution of humans and/or their crops, changing the cropping regime (e.g. temporally, spatially and/or by introducing different crops), and possibly even developing the economy from agriculturally dependent to whatever might be locally viable, thus all fall into the realm of conflict management.

Based on previous reviews (Sillero-Zubiri & Switzer 2001; Decker et al. 2002; Osborn & Parker 2002a,2002b,2003; Nelson et al. 2003; Dublin & Hoare 2004; Hoare 1995,2000,2001a,2001b,2003; WWF-SAPRO 2005; Balfour et al. 2007; Parker et al. 2007; Osei-Owusu & Bakker 2008; Treves et al. 2009), we outline below a number of control options in Table 10 to reduce human-wildlife conflicts in the study area. Again, we emphasise the necessity for communities and institutions to discuss these options, and their feasibility, in the local context.

In addition, we highly recommend the following publications for review of options concerning managing human-elephant conflicts, all of which are provided along with this report:

Balfour, D., H.T. Dublin, J. Fennessy, D. Gibson, L. Niskanen, and I.J. Whyte (eds.). 2007. *Review of options for managing the impacts of locally overabundant African elephants*. IUCN, Gland, Switzerland.

Hoare, R.E. 2001. *A decision support system for managing human–elephant conflict situations in Africa*. IUCN/SSC African Elephant Specialist Group: Nairobi, Kenya.

Nelson, A. Bidwell, P. and C. Sillero-Zubiri. 2003. *A review of humane elephant conflict management strategies*. People and Wildlife Initiative. Wildlife Conservation Research Unit, Oxford University.

**Table 10: Range of human-wildlife conflict control options and level of effectiveness**

Method	Description	Advantages	Disadvantages	Currently used at VMWR
<i>Dealing with animals directly</i>				
Dispersal (scaring)	<ul style="list-style-type: none"> <li>- Chasing ‘problem’ animals away from the area of conflict through the use of firearms, banging drums, or yelling.</li> <li>- Most often used against large herbivores.</li> </ul>	<ul style="list-style-type: none"> <li>- A commonly used approach.</li> <li>- Can be applied by individual farmer</li> <li>- Relatively cheap to apply</li> <li>- Most non-lethal</li> </ul>	<ul style="list-style-type: none"> <li>- Has limited success. Most animals are likely to move away temporarily only, soon learning that the activity constitutes no real threat (habituation).</li> <li>- Requires high degree of vigilance and co-operation amongst farmers.</li> <li>- Can be threatening to people if used too close to dangerous animals</li> </ul>	Yes
Guarding	<ul style="list-style-type: none"> <li>- Guarding is undertaken throughout the year, but often increases in the harvest season when the risk from crop raiding is perceived to be at its greatest.</li> <li>- Sometimes used with watchtowers and/or scarecrows.</li> </ul>	<ul style="list-style-type: none"> <li>- A commonly used approach.</li> <li>- Can provide ‘early detection’ of problem animals, making other methods more effective and reducing damage.</li> </ul>	<ul style="list-style-type: none"> <li>- Guarding can be costly both directly, and also indirectly, through time that could be spent elsewhere, (e.g. women doing housework, children attending school) and as it is almost impossible for farmers to guard their fields all the time, it is inevitable that some crop raiding will still occur.</li> </ul>	Probably
Fire	<ul style="list-style-type: none"> <li>- These can be kept burning throughout the night in areas where raiding animals are regular visitors.</li> </ul>	<ul style="list-style-type: none"> <li>- A commonly used approach.</li> </ul>	<ul style="list-style-type: none"> <li>- Firewood may be difficult to obtain.</li> <li>- May extend beyond intended range and be destructive to ecosystem.</li> <li>- Can be dangerous for people if fires get out control.</li> </ul>	Yes
Lethal (destroying)	<ul style="list-style-type: none"> <li>- The killing of individual “problem animals”.</li> </ul>	<ul style="list-style-type: none"> <li>- Can be an effective solution in the short term.</li> <li>- Local residents can have access to meat.</li> <li>- Provides opportunity for revenue by offering the kill to a professional hunter.</li> <li>- Only warranted when the ‘problem animal’ has injured or killed a person.</li> </ul>	<ul style="list-style-type: none"> <li>- Can be extremely risky and should best be left to those with experience in hunting dangerous animals.</li> <li>- If the opportunity to kill the animal is offered to a professional hunter it will take some effort to co-ordinate this with all the parties concerned.</li> <li>- Any action needs to be taken quickly and those affected must be confident they can identify the animal responsible.</li> <li>- There is evidence that killing a predator (or problem elephant) only opens territory for others to come in.</li> </ul>	Historically?

Table 10...cont'd

Translocation	<ul style="list-style-type: none"> <li>- The trapping and moving of individual animals to new areas.</li> </ul>	<ul style="list-style-type: none"> <li>- Removes the problem without killing the animal.</li> <li>- Very specific animal(s) targeted.</li> </ul>	<ul style="list-style-type: none"> <li>- Very expensive.</li> <li>- Success dependent on the availability of skilled personnel to capture and transport the animal concerned.</li> <li>- Sometimes difficult to find a new location for the animal.</li> <li>- Very often animals return to their original territory if they are not moved sufficiently far away or become a problem at new site.</li> </ul>	No
<b><i>Barrier: Constructions, normally fences, which separate people from wildlife</i></b>				
Strand wire fences	<ul style="list-style-type: none"> <li>- Made of steel wire and droppers strung between metal poles, occasionally with a lower section of netting to keep out smaller animals.</li> </ul>	<ul style="list-style-type: none"> <li>- Can be used by individual farmers</li> </ul>	<ul style="list-style-type: none"> <li>- Their effectiveness depends on the design, construction and maintenance of the fence.</li> <li>- Are generally ineffectual against large herbivores and carnivores.</li> <li>- Require considerable upkeep.</li> <li>- Vulnerable to theft and vandalism</li> </ul>	No
Post fences	<ul style="list-style-type: none"> <li>- Solid barriers normally built with locally available timber</li> </ul>	<ul style="list-style-type: none"> <li>- Good at separating off small areas.</li> <li>- Good for the construction of secure 'bomas' or 'kraals'.</li> </ul>	<ul style="list-style-type: none"> <li>- Very time consuming to build.</li> <li>- Not suitable for the large scale separation of people and wildlife.</li> <li>- Can demarcate land use so may assist in land use zoning or law enforcement</li> <li>- Creates abrupt divisions or 'hard edges'</li> </ul>	No
Electric fences	<ul style="list-style-type: none"> <li>- Similar in design to strained fences, consisting of two different sets of wires which are electrically charged.</li> <li>- When an animal attempts to cross the fence it receives a powerful electric shock.</li> <li>- The design of the fences must be such as to withstand the challenges posed by large mammals.</li> </ul>	<ul style="list-style-type: none"> <li>- Are effective animal deterrents, <u>if adequately maintained</u>.</li> <li>- Provide tangible proof of action against HWC to communities</li> </ul>	<ul style="list-style-type: none"> <li>- Has limited success, especially if not maintained.</li> <li>- Most animals are likely to move away temporarily only, soon learning that the activity constitutes no real threat (habituation).</li> <li>- Can demarcate land use so may assist in land use zoning or law enforcement</li> <li>- Vulnerable to theft and vandalism</li> <li>- Creates abrupt divisions or 'hard edges'</li> </ul>	Yes, partially

Table 10...cont'd

Pepper dung / pepper spray (repellants)	<ul style="list-style-type: none"> <li>- This is made from elephant dung mixed with ground chili and compacted into brick mould and dried in the sun.</li> <li>- These bricks can then be burnt along the edge of the field creating a noxious smoke, which acts as a deterrent to animals specifically elephants.</li> </ul>	<ul style="list-style-type: none"> <li>- Can be effective</li> <li>- Can be produced locally</li> <li>- No long term harmful physical effects on wildlife</li> </ul>	<ul style="list-style-type: none"> <li>- Can be costly, depending on method used and availability of products</li> <li>- Spray development requires training of people</li> <li>- Spray deployment required within close proximity to elephant</li> <li>- Direction of effect may be wind-dependent</li> <li>- Effects may be temporary irritant to people and non-target wildlife with accidental exposure</li> </ul>	No
Other	<ul style="list-style-type: none"> <li>- Other options, such as trenches, rock piles and stonewalls can be used to protect water installations and other resources from large animals.</li> </ul>	<ul style="list-style-type: none"> <li>- If well constructed these can be highly effective and maintenance costs are minimal.</li> </ul>	<ul style="list-style-type: none"> <li>- Can be expensive and time consuming to construct.</li> </ul>	??
<b>Predator control</b>				
Herder dogs	<ul style="list-style-type: none"> <li>- Dogs are used to accompany livestock on their daily grazing forays. - Dogs must be introduced to the livestock as puppies and must grow up with the livestock.</li> </ul>	<ul style="list-style-type: none"> <li>- Is a highly effective method.</li> <li>- Used in both Namibia and Botswana with a reasonable degree of success.</li> </ul>	<ul style="list-style-type: none"> <li>- Takes time to train dogs.</li> <li>- It has not always been easy to convince farmers to adopt this option.</li> </ul>	No
Bomas / kraals	<ul style="list-style-type: none"> <li>- Use of a protective enclosure for the night as a barrier between livestock and any predators.</li> <li>- Dogs may be used to guard the boma.</li> <li>- Can also be used to keep newly born and young livestock in during the day.</li> </ul>	<ul style="list-style-type: none"> <li>- Highly effective small enclosures.</li> </ul>	<ul style="list-style-type: none"> <li>- Not suitable for large areas as are expensive and time consuming to construct.</li> </ul>	??

Table 10...cont'd

<b>Land use planning: Land use planning is a long-term method for helping to reduce human-wildlife conflict. It is fundamental for the good management of wildlife, but land use planning and any changes in land use that are agreed can take several years to negotiate and implement.</b>				
Buffer zones	- The clearing of a section of woodland along the boundary of a field. This allows the farmer to spot approaching animals and it may act as a deterrent to approaching wildlife.			No
Buffer crops	- Growing crops which are not palatable to wildlife or known crop raiding animals, such as chilies, on the edge of the field and palatable food crops in the middle of the field close to the watchtower or homestead. - Deters the passage of the animal and gives the farmer sufficient notice of the approaching animal	- Can be sustainable, as there are several benefits to the individual farmer - It does not require much input - There is currently governmental interest and support for expanding paprika (chili) planting and commercialization in Malawi (Govt. of Malawi 2005)		No
<b>Other</b>				
Beehives	- Beehives are placed on the edge of the fields and bees are conditioned to react to approaching animals. - Can be used not only for big herbivores but even for smaller problem animals.	- not been well tested, although trials have been done in Kenya.		No
Baboon urine	- Taking soil where baboons had urinated and then making up a solution (water mix) and spraying it along the edge of the field. On sniffing the ground baboons retreat.	- Tried in Eastern Highlands of Zimbabwe, but not scientifically proven.		No

#### 5.4. Compensation

Based on our research findings, guidelines for developing a problem animal *ex-post* compensation scheme in the study area are provided below. It should be noted that compensation schemes are generally not a good long-term solution as the root cause of the problem is not being addressed (Hoare 2001b), they create continuing financial burdens and increase expectations (Crawshaw Jr. 2004; Graham et al. 2005) and, in some cases, may be counter productive to conservation by stimulating agricultural expansion (Bulte & Rondeau 2005). Therefore, parallel efforts such as those described above to minimise animals escaping and more effective and timely control of incidents must be pursued.

1. Problem animal compensation schemes must be:
  - Environmentally responsible;
  - Economically sustainable within local context;
  - Socially responsible (building on local tradition and cultural values compatible with nature protection); and
  - Implemented under a mutually agreeable and communally signed agreement that clearly sets forth specific responsibilities, contributions, and obligations of each partner.
2. Distinctions must be made between types of damage, their definition, and what compensation values, if any, should be assigned to each (Schwerdtner & Gruber 2007). These include:
  - Persons – death, injury, fear.
  - Livestock – type, death vs injury, disease transfer.
  - Crops – type, extent, maturity of crops.
  - Property – fences, kraals, buildings, etc.
  - Indirect damage through active guarding of crops and livestock – e.g. reduced education for school children, loss of labour, risk of increased exposure to malaria, concern that households could be robbed while they are absent.
3. Compensation must be close to, but not exceed market value. This should be regularly adjusted to reflect market price fluctuations (Ogra & Badola 2008).
4. Problem animal damage should be assessed as soon as possible and an agreed-upon protocol utilizing a rigorous verification mechanism should be designed in assessing damage (Sangay & Vernes 2008). Ideally, qualified individuals would base authorising compensation payment on this assessment.
5. Compensation should ideally reach the household level of affected victim. This aspect obviously requires built-in accountability and monitoring to ensure that those crop or livestock owners who have suffered damage are the ones who receive the compensation.
6. Compensation should be paid out in a timely manner. Studies elsewhere have shown that farmers do not participate in, or report to, schemes that involve lengthy

delays in payments (Mishra 1997; Choudhury 2004; Graham et al. 2005; Ogra & Badola 2008).

7. Compensation funds should be sought from the Department of National Parks and Wildlife Fund (see §104 of NPWA Act 2004) and/or funding channelled from VMWR gate fees through NVANRRD.
8. To avoid the ‘free rider’ problem, linking eligibility of compensation to improved management practices (e.g. animal husbandry, spatial distribution of crops) should be encouraged (Nyhus et al. 2003).
9. Compensation scheme should be flexible and adaptive, involving a feedback system that allows for regular evaluation and monitoring of both DCA incidents and stakeholder perceptions (Nyhus et al. 2003). Relevant parties should adjust scheme annually to reflect this feedback.
10. Communication at all levels is a priority. This implies the need for a more streamlined reporting system than currently exists.

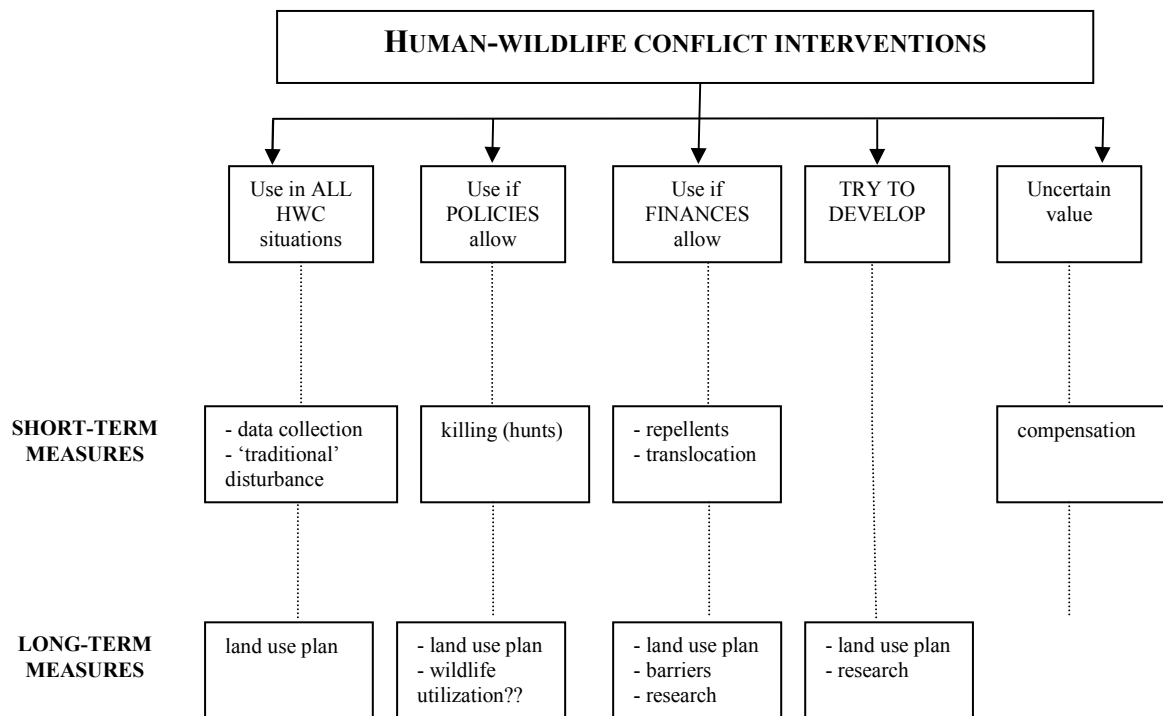
### **5.5. Further research**

As there is currently a dearth of research on human-wildlife conflict in the VMWR area, we advocate a stronger research agenda for this issue than currently exists. More specifically, we identify the following research areas in which we believe would significantly contribute to developing a framework for reducing conflict in the area.

- *Research on livestock depredation:* rates of livestock depredation can be influenced by diurnal patterns, and local environmental conditions including rainfall and natural prey abundance. Research investigating factors that contribute to livestock depredation by predators should be actively encouraged (behavioral ecology, fence designs, distribution patterns, etc.).
- *Research on crop depredation:* studies have been undertaken to examine forage selection and activity patterns of buffalo and other herbivores. Similar to the recommendation above, research should be pursued which examines how and why wild herbivores leave the VMWR.
- *Research on deterrent measures:* depredation can be correlated with human population densities, livestock husbandry practices, farm characteristics and livestock enclosure designs, and crop availability and forage quality. Research should be undertaken to assess deterrent measures for both carnivores and herbivores to reduce human-wildlife conflicts e.g. buffer areas, chili peppers, and goat enclosures.
- *Research on community attitudes towards conservation in general, and VMWR specifically:* input of social science in the problem animal issue is tantamount as local politics and socio-cultural constraints may preclude any proposed interventions.

### 5.6. Summary

In summary, we have proposed a number of institutional adjustments, more streamlined and comprehensive information and reporting, problem animal control options, and a compensation scheme framework. Finally, we identify areas where further research would be beneficial. Figure 14 below summarises these interventions under the practical constraints facing the VMWR and its neighbouring communities.



**Figure 14: The use of HWC interventions under practical constraints**  
(adapted from Hoare 2001b)



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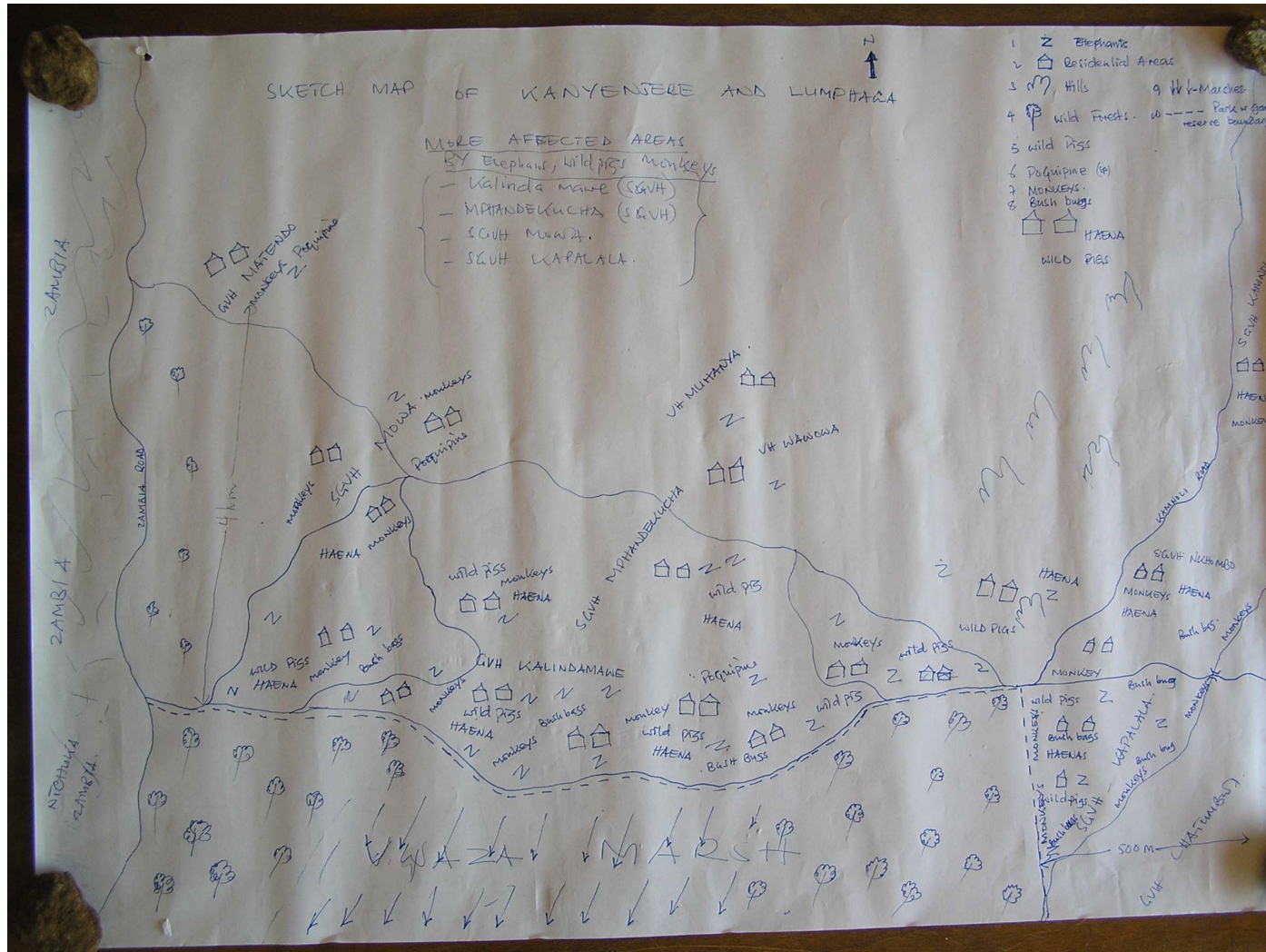
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# APPENDIX A: PARTICIPATORY MAPS

## Zolokele Zone (1)





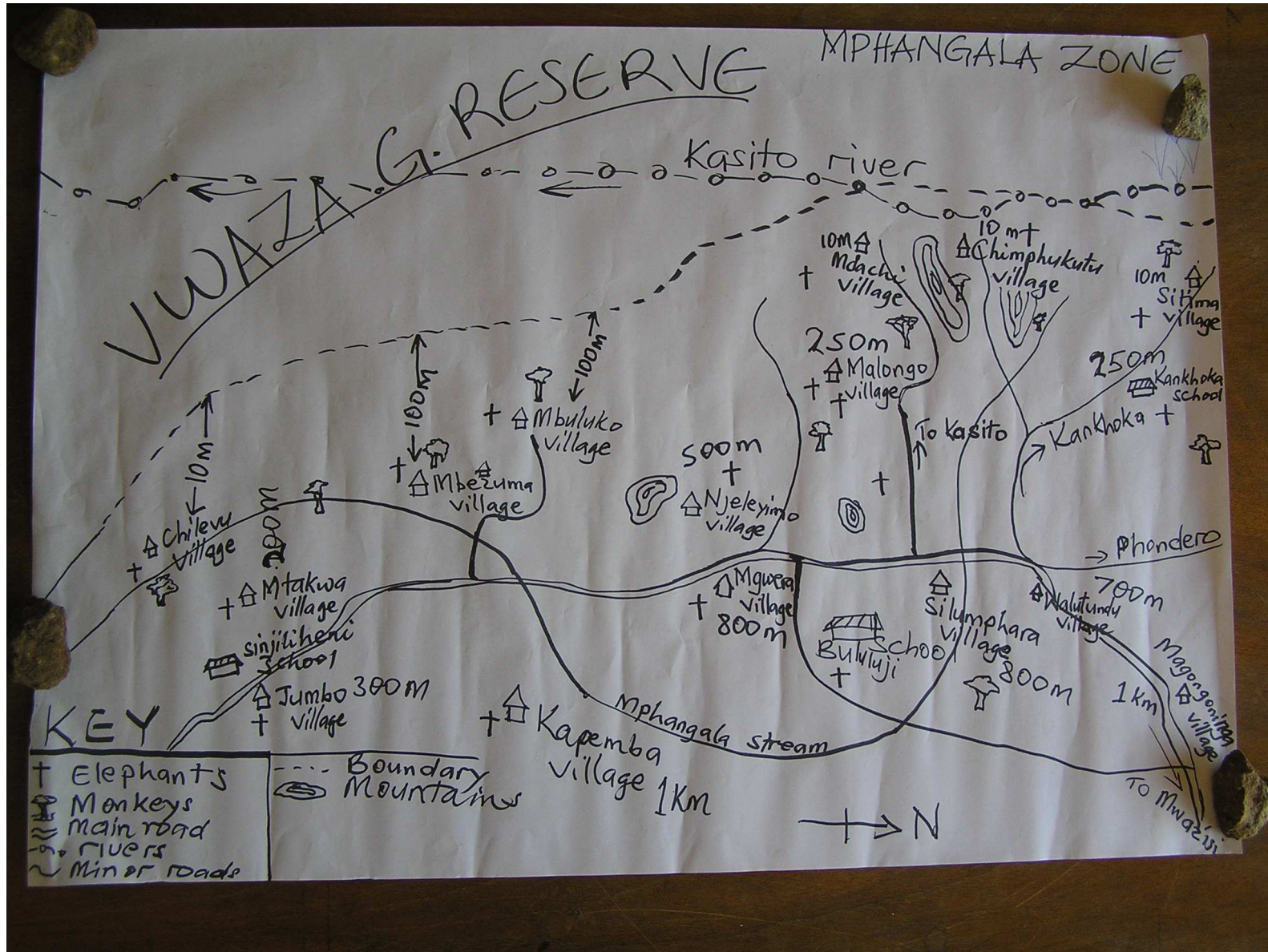


Mwazisi Zone





Mphangala Zone

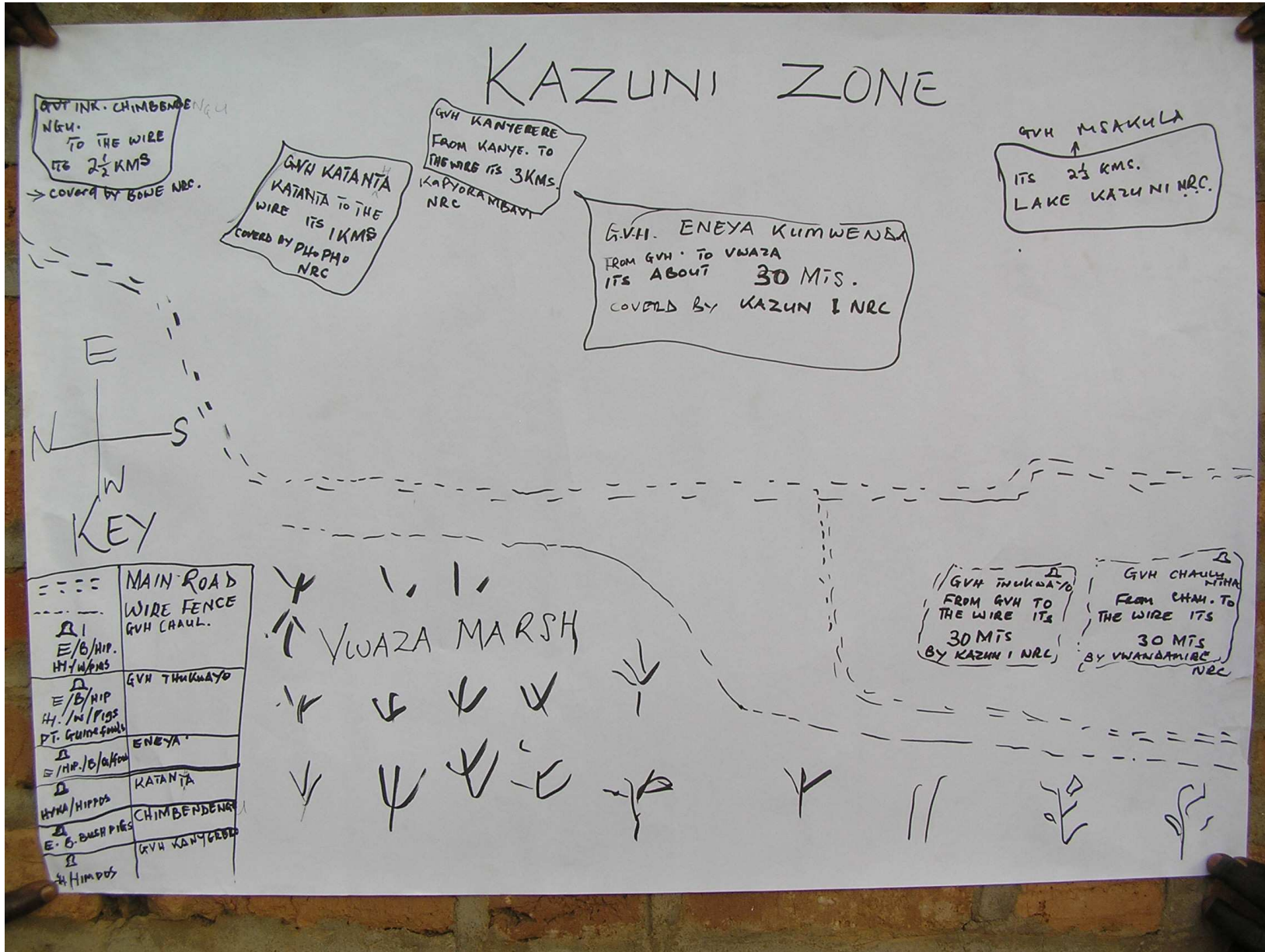




Kamphenda Zone (2)



Kazuni Zone







## APPENDIX B: TAXONOMIC NOMENCLATURE

Latin Name	Vernacular (Tumbuka)	English Name
<i>Accipitridae</i> (family)	nombo / chimphanga / kabawe	Raptors
<i>Cercopithecus aethiops</i>	mbwengu	Vervet monkey
<i>Civettictis civetta</i>	zongwala / zukazuka	Civet
<i>Crocuta crocuta</i>	chimbwi	Spotted hyena
<i>Dispholidus typus</i>	nkhomi	Boomslang
<i>Francolinus</i> spp.	nkhwari	Francolins
<i>Glossina</i> spp.	kaskembe	Tsetse fly
<i>Hippopotamus amphibius</i>	chigwere	Hippo
<i>Hystrix africaeaustralis</i>	chinungu	Porcupine
<i>Leptailurus serval</i>	chiwalawala	Serval
<i>Loxodonta africana</i>	zovu	African elephant
<i>Mellivora capensis</i>	chiuli	Honey badger
<i>Numida meleagris</i>	nkhanga	Helmeted guineafowl
<i>Panthera leo</i>	nkhalamu	Lion
<i>Panthera pardus</i>	nyalubwe	Leopard
<i>Papio ursinus</i>	nkhwele / munkhwele	Chacma Baboon
<i>Paraxerus lucifer</i>	benga	Squirrel
<i>Phacochoerus aethiopicus</i>	munjiri	Warthog
<i>Potamochoerus porcus</i>	nguluwe	Bushpig
<i>Syncerus caffer</i>	njati	Cape buffalo
<i>Tragelaphus scriptus</i>	chikwiwa	Bushbuck
<i>Varanus nilotictus</i> ; <i>V. exanthematicus</i>	mbulu / kababa	Monitor lizard