



Wildlife Conservation
Manual

**Solutions to
Human-Carnivore Conflict**

Resource for Leaflet 'How to Protect Your Livestock from Carnivores'

Contents

Introduction:	02
What is the objective of this Manual?	
Why Protect Carnivores?	03
Lessons and reasoning for communities	
Why Killing Carnivores Does Not Work	04
Lessons and reasoning for communities	
Community Mitigation Methods:	05
Methods for boma and grazing improvements	
Conservation Organisation Mitigation Methods:	08
Methods for organisations and methods to increase benefits from wildlife for communities	
Glossary of terms	09
References	10

Introduction to the Manual

Human-Carnivore Conflict (HCC) is one of the main causes of species decline across the globe, carnivores killing domestic livestock sparks retaliation against wildlife. There are solutions to HCC but its important efforts are focused on those known to be successful and sustainable. This manual pulls together solutions to HCC that are both relatable and practical to communities in HCC zones as well addresses wider issues more suitable for organisations to tackle.

What is the objective of this manual?

The manual is designed specifically for HCC issues in Africa. The aim of the manual is to help guide conservation organisations in implementing scientifically proven solutions to HCC. The manual describes the solutions available to communities living in HCC zones, as such this manual can be used as a teaching aid when delivering community outreach or education alongside the 'How to Protect Your Livestock from Carnivores' leaflet.

There is no single solution to HCC, addressing the problem relies on a combination of solutions. It is important conservation organisations work closely with communities and help support their efforts in alleviating HCC. Conservation organisations should also target mitigation methods that communities do not have control over as such this manual will also recommend mitigation methods more suitable for organisations.

Why Protect Carnivores?

Carnivores manage herbivore populations

The complex relationship between predator and prey, and between competing predators is directly linked to herbivore populations. As such it's important the complex relationship is not disturbed to minimize the risk of herbivore behaviour and populations from changing (1). Removal of apex predators will cause a trophic cascade which will cause disruption and negative effects at all levels of an ecosystem (2, 3). Without predators, herbivores change their behaviour and become increasingly confident, which could lead to an increase in herbivore crop raiding, change in grazing areas, reduced pasture availability and ultimately increase human-wildlife conflict.

Carnivores regulate disease in the environment

Diseases play important roles in regulating ecosystems, outbreaks have the ability to considerably disrupt ecosystems and likewise the loss of long term diseases can also lead to profound effects on ecosystem function (4, 5). For example the loss of rinderpest virus, which had historically kept wildebeests numbers low on the Serengeti, led to an irruption in wildebeest population causing very high levels of over grazing (5). Carnivores are very important as they stop and regulate disease outbreaks by removing the sick individuals before the disease is able to spread throughout the population and potentially onto domestic livestock.

National pride, carnivore's are part of culture

Carnivores are beautiful and iconic symbols of Africa. Many African countries are incredibly proud of their natural heritage and carnivores are heavily imbedded into their cultures.

Wildlife tourism, receive tourism benefits

People travel from all over the world to see Africa's wildlife, by helping maintain a healthy wildlife population will in turn increase the popularity of the area to tourists. Tourism can provide local employment, local development (such as schools and health services) and local market opportunities in goods and services (6).



African Wild Dog

Why Killing Carnivores Does Not Help Protect Livestock?

Disrupts social structure causing family group to be more mobile and disperse further

Black-backed jackals are heavily persecuted in Southern Africa but still remain at relatively high population densities this is because when jackals are hunted it disrupts their social organization, reproduction and dispersal rates. The removal of dominant individuals will increase immigration rates as territories are no longer withheld (7).

Opens up territory giving opportunity for another carnivore to move into the area

Most carnivores are highly territorial therefore by removing a dominant individual from an area will allow for another individual to move in from surrounding areas (the open territory acts as a sink) (8). By removing one problem you will effectively introduce another.

Can cause some carnivores to adapt reproductive behaviour and increase offspring rate

The purposeful or accidental removal of dominant males will allow young males to reproduce with females. Young male jackals will also increase pregnancy rate in females to offset high mortality (7).

'Taste for livestock' is more often learnt from the environment, it is rarely past between individuals therefore it is better to prevent carnivores from killing livestock in the first place to avoid them developing a 'taste for livestock'.

By preventing carnivores from killing livestock and developing a 'taste for livestock' will be economically beneficial in the long run because non-lethal mitigation methods are associated with higher levels of protection which inevitably will mean less livestock are killed. By making sure no 'taste for livestock' is developed will actively prohibit repeat attacks from individuals (9).



Boma and livestock from the air

Community Mitigation Methods:

Community mitigation methods, the following information should be used to aid outreach and education alongside the leaflet 'How to protect your livestock from carnivores'.

Boma Mitigation Methods			
Method	Description	✓ Do use	✗ Do NOT use
Opaque Walls	Livestock cannot see carnivores outside of boma. If livestock can see carnivores they are more likely to stampede and break out of boma, which massively increases the chance of livestock being killed (8).	Opaque walls – any construction material that will make the wall or fence opaque. The diagram in the leaflet depicts four materials that can be sourced locally and sustainably (thatch, thorn bush, mud, stone). Plastic tarpaulin and metal sheets can also be used but are often too expensive. Walls must also be strong, so transparent materials, such as wire and wooden poles should be used to construct strong frames which opaque materials can be applied to (10-12).	Transparent walls – Wire mesh, although widely used (more often by commercial ranches) it does not stop livestock from stampeding and often if livestock do break out of boma repairs to wire mesh is expensive. Thorn bush (acacia stems) and wooden poles are also widely used but often not packed tight enough. Thorn bush is particularly susceptible to hyena attacks, as hyena can force through thorn bush walls (10-12).
Thorn bush on outside of opaque boma walls	Leopards usually jump or climb over boma walls. Thorn bush or similar materials like barbed wire will prohibit leopards from climbing walls (13).	Thorn bush tightly packed against a strong opaque wall. It's important the whole outside of the boma is covered in thorn bush, even the gate, as leopards will find the smallest area not covered to climb. To prevent jumping make thorn bush thick and high (13).	Easily climbable or low walls. Thatch, mud, stones, wire and wooden poles are all easy to climb. If there is no threat of leopard attack, focus more on creating strong opaque walls (13).
Reinforced gates	Gates are often the weakest component of a boma and where most carnivores manage to force access (14).	Construct gates out of old oil barrels or heavy duty wood. If there are gaps when gate is closed fill gaps with thorn bush or barb wire. Use as few gates as possible (14).	Loosely packed thorn bush as a gate or gates with big holes.
Use boma at night	The use of a boma is the single best way to reduce livestock loss (11, 12, 15).	A well-built boma, with strong opaque walls and reinforced gate (11, 12, 15).	A poorly-built boma, with transparent weak walls and fragile gate (11, 12, 15).

<p>Guard dogs</p>	<p>Dogs can be trained to bark at approaching carnivores, their main role is to act as an early warning system. Having dogs allows the herder to sleep at night (16).</p>	<p>Most local breeds are suitable and often free, the dog must be trained to be attentive and alert. (Anatolian shepherd dogs are the best breed however they can be expensive and not locally available) (9, 16-18).</p>	<p>Dogs trained to kill animals or dogs that are inattentive and lazy (17, 19).</p>
<p>Solar powered light</p>	<p>Carnivores are sometimes scared of light. A small solar powered light is usually inexpensive in a local market, or communities already own lights for their homes (20).</p>	<p>Solar powered light at the edge of the boma on overcast nights or when there is no moon, as carnivores are more likely to hunt when it's a dark night (20).</p>	<p>Solar powered light continuously as carnivores will become habituated to it (20).</p>
<p>Scarecrow</p>	<p>Scarecrows are made to resemble a human figure with the aim to scare carnivores away.</p>	<p>N/A</p>	<p>Scarecrow, carnivores become habituated quickly and they often attract more wildlife than they scare away (11, 14, 21).</p>

Inside of 'How to Protect Your Livestock from Carnivores' leaflet

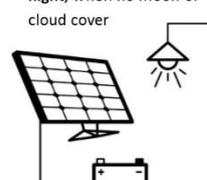
How to Protect Your Livestock from Carnivores?
Issue 1
March 2017

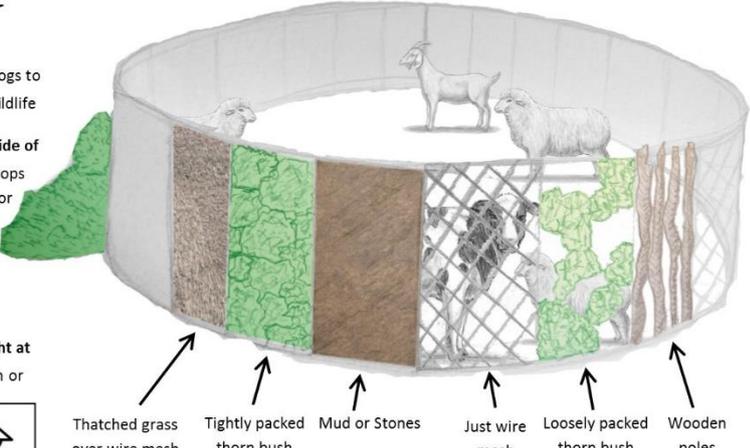
How to Improve your Boma

DO use



- ✓ Guard dogs, train dogs to bark at approaching wildlife
- ✓ Thorn bush on outside of opaque boma walls, stops leopard from jumping or climbing over wall
- ✓ Reinforced gates
- ✓ Boma at night
- ✓ Solar powered light at night, when no moon or cloud cover





Do NOT use



- ✗ Scarecrows
Carnivores learn they are not dangerous, attract more carnivores than they scare

- ✗ Hyenas — thorn bush as hyena can barge/force entry into boma.
- ✗ Leopard — easy to climb surfaces or jumpable low walls
- ✗ Lion — transparent walls
- ✗ Cheetah & Wild Dog most likely to take livestock while grazing

✓ **Opaque boma walls**
Why? Livestock cannot see carnivores so less likely to stampede

✗ **Transparent boma walls**
Why? If livestock see carnivores they will stampede and break out of boma

Diagrams & Photos by Jamie Unwin

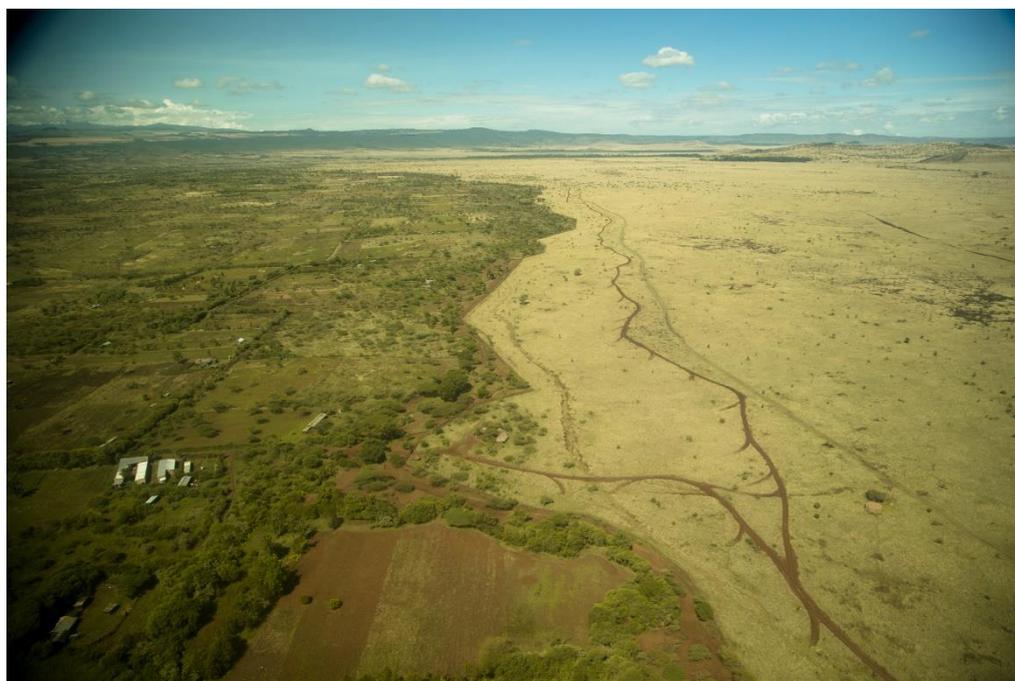
Grazing Mitigation Methods			
Method	Description	✓ Do use	✗ Do NOT use
Adult herders	Herders are traditionally used to supervise livestock while grazing (22).	Experienced adult herders, armed with spears and clubs to protect against a carnivore attack. If possible, multiple herders is better than one and keep all livestock in sight (9, 11, 13, 14, 19, 22, 23).	Inexperienced children or woman herders, they are more likely to run away and less tentative to livestock if carnivore attack (9, 11, 13, 14, 22).
Graze in open areas	Livestock and carnivores can be seen more easily, carnivores can less easily pick off individuals (13, 14).	Graze in open areas away from known territories of carnivores (13, 14)	Avoid grazing in areas with poor visibility (13, 14).
Graze away from protected areas	Proximity to the boundary of protected areas will increase chance of HCC (15).	Pastures as far as possible from boundary of protect areas (15).	Pastures adjacent to boundaries of protected areas (15).
Take guard dogs with herd	Dogs can be trained to spot, hear or smell approaching carnivores as well keep livestock bunched while grazing. Their main role is to act as an early warning system (16).	Most local breeds are suitable and often free, the dog must be trained to be attentive and follow the livestock while grazing. (Anatolian shepherd dogs are the best breed however they can be expensive and not locally available) (9, 16-18).	Dogs trained to kill animals, dogs that are inattentive and lazy. Dogs that chase other wildlife and do not follow livestock herd (17, 19).
Graze during day	Carnivores most likely to attack at night, dawn or dusk (11).	Herders should be most vigilant at dawn and dusk and graze livestock predominantly in day light hours (11).	Graze at night (although sometimes unavoidable if trying to avoid extreme heat of day) (11).

Conservation Organisation Mitigation Methods:

Conservation organisation methods, the following information is specific to conservation organisations.

Conservation Organisation Mitigation Methods	
Method	Description
Education	Educating is the most important method in increasing cooperation between communities and wildlife. It's incredibly important the education delivered is relatable, appropriate and not demonising or accusative. Education shouldn't just teach ways to tolerate carnivores it should also aim to inspire communities about the remarkable animals they live alongside (10, 24-26).
Domestic diseases	Encouraging the use of guard dogs should be coupled with the increase in rabies vaccination programs, it is possible for rabies to be past between domestic and African wild dogs (14).
Carnivore alarm system	Radio collar the most problematic carnivores and use a text messaging system to alert communities of approaching danger (11).
Community conservancies	Help communities establish community conservancies, empower people to work collaboratively together. Help establish designated grazing areas and better manage pastures to avoid over grazing, in turn this will build a more robust society capable of combatting drought (10, 26-28).
Carnivore guardians	Potentially help establish and employ 'community carnivore guardians' responsible for monitoring the health of the local wildlife and keeping track of people as they improve herding practises (29).
Electric fences	In communities particularly close to boundaries of protect areas, construct electric fences to prevent livestock from entering community land. It's very important the community feel ownership of the fence and are involved in its maintenance (20).
Light & Sound devices	Help purchase expensive light and sound devices to deter carnivores (20).
Increase wild prey	Less focus should be put on increasing wild prey as it's relatively difficult to achieve in the short term and increased wild prey populations have the potential to increase human-wildlife conflict as competition between wild herbivores and livestock for pasture will increase. It's important to set realistic goals and consider the carrying capacity of the land including both wildlife and domestic livestock. With better secured livestock expect carnivore populations to decrease slightly and wild herbivore populations to drop as carnivores shift to a 100% wild diet (20, 30). Furthermore different carnivore species have varying levels of tolerance to prey densities, for example wild dogs and cheetah can survive in areas with relatively low prey populations (31, 32) whereas lions require comparatively higher prey (33).
Translocation	Has been largely unsuccessful in the past couple decades in reducing HCC, due to its high cost and low success rate, other methods of mitigation should be considered first (34-36).
Lethal control	Should only be considered in the most of extreme circumstances, has the potential to improve HCC in the short term but is not a long term solution (8, 9, 21).

Methods to increase benefits of wildlife for communities	
Method	Description
Eco labels	Help establish eco labels for communities actively engaged in reducing HCC. Eco labels allow communities to sell their meat (as well other products) for a premium to tourism companies as well as other interested companies (10).
Tourism	Help establish communities to become actively engaged in all aspects of tourism from just welcoming tourists into their community to experience wildlife and culture all the way to helping set up a community owned tourism company (6, 37).
Compensation/Reward schemes	Compensation schemes are incredibly difficult to manage however a good alternative is to use reward schemes for people and communities who are actively helping reduce HCC. Reward schemes are better than compensation schemes because they don't rely on compensating for livestock losses (which can increase levels of corruption and mistrust) but instead encourage people to continue doing good work (10, 38, 39).



Boundary between farmland (on the left) and protected area (on the right).

Summary of terms:

Apex predator - is a predator residing at the top of a food chain upon which no other creatures prey

Boma – a fenced or walled enclosure for animals

Human-carnivore conflict - the interaction between wild carnivores and people and the resultant negative impact on people or their resources, or wild carnivores or their habitat

Human-wildlife conflict - the interaction between wildlife and people and the resultant negative impact on people or their resources, or wildlife or their habitat

Rinderpest virus – infectious viral disease of even-toed ungulates

Trophic cascade – predators in a food web suppress the abundance or alter the behaviour of their prey

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All photographs and diagrams credit Jamie Unwin

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