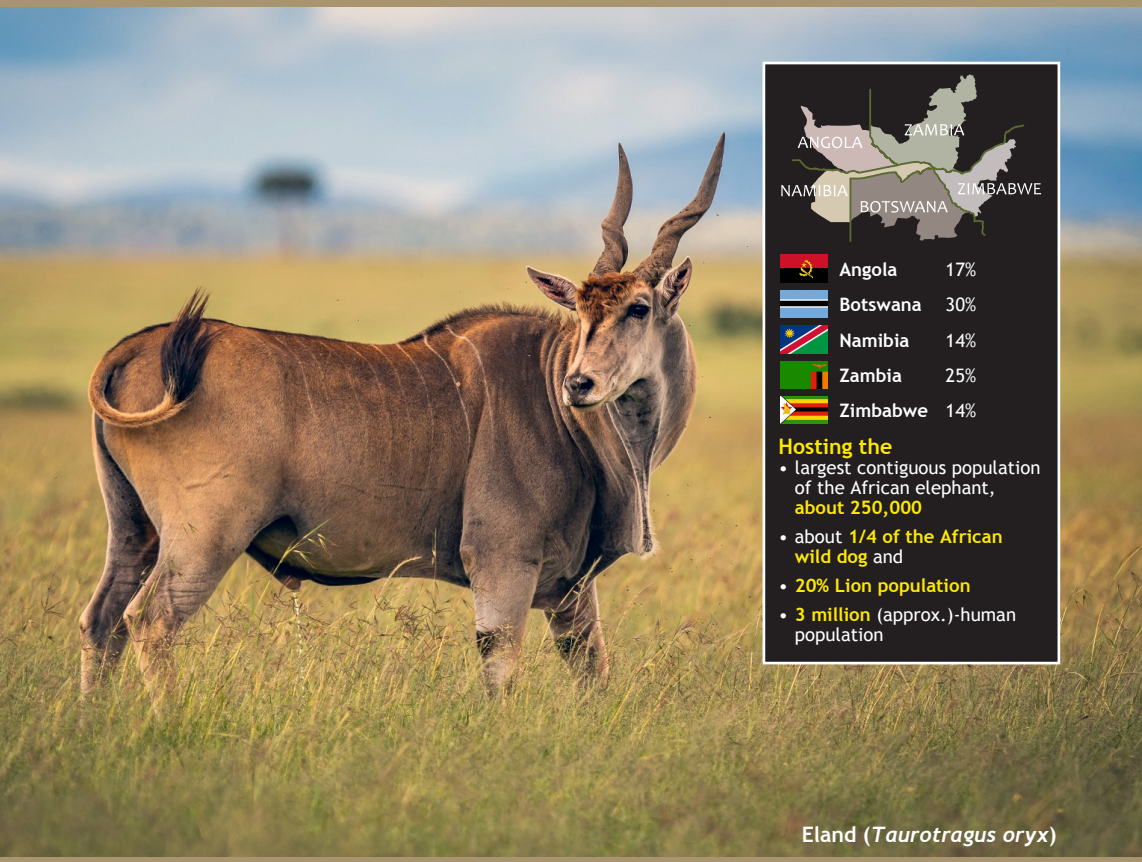
KAVANGO ZAMBEZI

TRANSFRONTIER CONSERVATION AREA (KAZA TFCA)

A MANUAL for REDUCING and MITIGATING HUMAN-UNGULATE CONFLICT (HUC)



Eland (*Taurotragus oryx*)

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Abbreviations

HUC	Human Ungulate Conflict
HWC	Human Wildlife Conflict
KAZA TFCA	Kavango Zambezi Trans-Frontier Conservation Area
PA	Protected Areas

KAZA Mission

"To sustainably manage the Kavango Zambezi ecosystem, its heritage and cultural resources based on best conservation and tourism models for the socio-economic wellbeing of the communities and other stakeholders in and around the eco-region through harmonisation of policies, strategies and practices"

1. Introduction

Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA) is a transboundary collaborative initiative of the five Partner States, Angola, Botswana, Namibia, Zambia and Zimbabwe, in the conservation of shared natural resources and the development of the communities in and around the landscape. The TFCA is a mosaic of multiple land uses composed of:

- Protected areas (PAs) in the form of: national parks; game reserves;
- wildlife/game management areas; forest reserves; and conservancies/ community concessions areas; and
- communal areas (settlement, pastoral, and arable farming)

There are about 3 million people settled across the KAZA landscape. The human population is mainly rural communities; largely dependent on subsistence pastoral and arable agriculture. The multiple land use status of the KAZA landscape present many development challenges and opportunities for the resident communities.

Human-Wildlife conflict is fast becoming a serious threat to the survival of many ungulates that include buffalo, eland, kudu, impala, common duiker, wild pigs and or warthogs among others. In the KAZA TFCA, wild ungulates, humans and their livestock have coexisted for millennia. Recent decades have seen a dramatic increase in the frequency of human/ungulates conflict resulting mainly from the ever-increasing human population's need for more land. The demographic and social changes have placed more people in direct contact with wild animals as settlements expand into and around protected areas. Within the KAZA TFCA and surrounding areas, where many rural people live in close proximity to protected areas, a single incidence of crop raiding can impose severe economic and livelihood hardships on individuals and families. In retaliation, humans usually shoot, poison, capture, injure or kill the animals. The manual particularly looks into conflicts with ungulates that are the most common in crop raiding and destruction.

KAZA TFCA, the world's largest transfrontier conservation area in the world, is an extremely important conservation landscape for large ungulates of all kinds including buffalo, eland, kudu and wild pigs among others. These ungulates are also a key attraction for the tourism industry in the KAZA landscape, therefore their persecution because of crop damage and harm to humans can have negative impacts not only on the ecological processes, but on the tourism industry as well. In order to reduce and mitigate the undesirable results of interactions between humans and ungulates, there is need to provide information to all stakeholders in KAZA TFCA on various methods that may enable more harmonious coexistence of people and these animals.

Figure 1: Impala (Aepyceros melampus) bull. One of the most common and graceful antelopes.

1.1 Goal of the manual

The overall goal of this manual is to:

- improve the understanding of conflicts between people and ungulates; and
- Assist the affected communities in applying best management practice to reduce and mitigate the conflicts.

1.2 Objectives of the manual

The objectives of this Manual are to:

- Equip communities with knowledge on human ungulates conflicts; and
- Assist communities to understand and apply best management practices in mitigating human ungulates conflicts.

1.3 Targeted users of the manual

- Farmers (subsistence and commercial) experiencing and affected by human ungulates conflicts
- Wildlife managers and extension officers of natural resources management
- People interested in coexistence of people and ungulates

2 Human ungulate conflict

The agro-based communities adjoining protected areas in the region are experiencing recurrent incidences of crop raiding by ungulates. Furthermore, human attacks resulting in injuries and sometimes deaths and also loss of livestock through zoonotic diseases are commonplace.

2.1 Behavioral traits of ungulates

Buffaloes

Feeding and diet: African buffalo are herbivores and they devote a large proportion of their time to feeding. After grazing grass and sedges, they spend time chewing their cud, or bolus, to extract more nutrients from their food. They prefer the leaves of grass, which dominate their diet during the wet season. In the absence of suitable feed and during drought, the buffalo can adapt to unlikely resources or will travel long distance in order to find it.

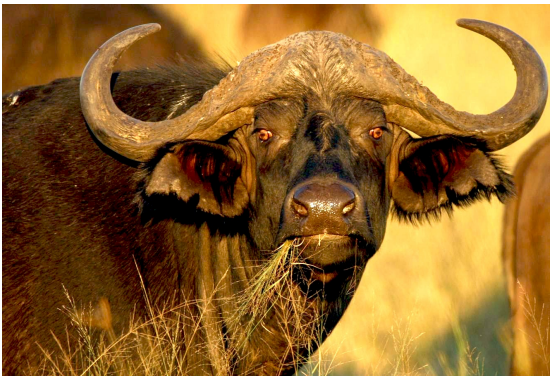

Figure 2: African or Cape Buffalo (Syncerus caffer) live in large herds.

Habitat: African buffalo can live practically in any habitat with permanent water and grass. They are found in dense lowland forests, lowland rainforests, montane forests and grasslands, Acacia grasslands, miombo woodlands, coastal savannas, plains and semi-arid bushland. They prefer close proximity, less than a kilometre, to water and are only found within 20 km of water.

Behaviour: They are social and congregate in herds ranging from a few individuals to over a thousand. In general, herds are smaller in denser vegetation. They are not strictly diurnal, but exhibit activity throughout the 24 hours of a day, usually with rest periods of low activity in the early morning and late afternoon. Decisions about where to graze seem to be determined by the females, because if the males in the front stop to graze before their predetermined destination has been reached, the females behind simply continue without them.

Common Eland

Figure 3: Common Eland (Taurotragus oryx) are great jumpers, despite their huge size.

Habitat: The common eland prefers habitats with a wide variety of flowering plants such as savanna, woodlands and open and montane grasslands. Eland avoids dense forests.

Feeding: They are herbivores that browse during drier winter months but have also adapted to grazing during the rainy season when grasses are more common. They require a high-protein diet of succulent leaves from flowering plants but will consume lower quality plant material if available including forbs trees, shrubs, grasses, seeds and tubers. The eland can conserve water by increasing its body temperature. Most of their water is obtained from their food, though they will drink water when available. Eland feed during the night in hot weather and sleep for long periods during the day.

Reproduction: Females are sexually mature at 15–36 months and males at 4–5 years. Mating may occur any time after reaching sexual maturity, but is mostly seen in the rainy season. Mating begins when elands gather to feed on lush green plains with plentiful grass, and some males and females start mating with each other in separate pairs. Females have a gestation period of 9 months, and give birth to only one calf each time.

Sociality: Males, females and juveniles each form separate social groups. The male groups are the smallest; the members stay together and search for food or water sources. The female group is much larger and covers greater areas. They travel the grassy plains in wet periods and prefer bushy areas in dry periods.

Behaviour: Eland are nomadic as they regularly move to and from same areas without a fixed area of habitation. They are also crepuscular (active primarily during twilight), non-territorial and form herds of up to 500 animals. The common eland is the slowest antelope, with a peak speed of 40 kilometres per hour that tires them quickly. Elands are capable of jumping up to 2.5 metres from a standing start when startled up to 3 metres for young elands.

Kudu

Figure 4: Greater Kudu (Tragelaphus Strepsiceros) has a life span of up to 10 years in the wild and 23 years in captivity.

Feeding: Their diet consists of leaves, grass, shoots and occasionally tubers, roots and fruit. They feed and drink in the early morning and late afternoon, acquiring water from waterholes or roots and bulbs that have a high water content. Although they tend to stay in one area, the greater kudu may search over a large distance for water in times of drought.

Habitat: Their habitat include mixed scrub woodlands. The kudu is one of the few largest mammals that prefer living in settled areas – in scrub woodland and bush on abandoned fields and degraded pastures, mopane bush and Acacia in lowlands, hills and mountains. They will occasionally venture onto plains only if there is a large abundance of bushes, but normally avoid such open areas to avoid becoming an easy target for their predators.

Behaviour: During the day, kudus normally cease to be active and instead seek cover under woodland, especially during hot days. Herds disperse during the rainy season when food is plentiful. During the dry season, there are only a few concentrated areas of food so the herds will congregate. Greater kudu are not territorial, they have home areas instead. Not fast enough to escape its main predators over open terrain, so it tends to rely on leaping over shrubs and small trees to shake off pursuer. Greater kudus have excellent hearing and acute eyesight which helps to alert them to approaching predator.

Impala

Habitat: Impalas prefer savannah habitats, open woodland and grasslands often near a water source. Areas of short grass with medium or dense stands of bush and a permanent water supply are the ideal impala habitat. They avoid, at all costs, areas of tall grass.

Figure 5: A herd of female impala (ewes), the most abundant ruminant in the KAZA TFCA.

Feeding: Impalas are both grazers and browsers that feed upon grass, fruits, leaves from bushes and trees, shoots and seedpods. Impalas are active both day and night and are dependent on water.

Behaviour: Impalas are highly gregarious animals which form herds of several hundred animals. When conditions are harsh in the dry season, they come together in mixed herds to search for food. During the more plentiful wet season, males and females will separate into different herds. Impalas are very quick and agile creatures capable of jumping high in the air performing displays called pronking (as a form of display or when alarmed) and clearing heights greater than 3 metres.

Reproduction: Impala breeding season occurs at the end of the wet season around May. After a gestation period of 7 months a single lamb is born and will be strong enough to walk within a couple of hours. The female gives birth in an isolated spot away from the herd. Females give birth for the first time at the age of 3 years.

Common Duiker

Figure 6: Common Duiker (Sylvicapra grimmia).

Habitat: It is found in grassland, savannah woodland, and karroid shrubland in the south of Sahara in Africa. Generally, they are found in habitats with sufficient vegetation cover to allow them to hide savannah and hilly areas, including the fringes of human settlements.

Feeding: The common duiker has a wide diet. They are omnivores, they typically eat the leaves and shoots of bushes, and fruits and flowers that feeding birds have dropped to the ground. They also dig up tubers and roots with their hooves. Common duikers may also eat insects and even lizards, frogs, rodents and nestling birds. Occasionally they may eat carrion.

Behaviour: Common duikers are active early in the morning, in the evening, and at night. During the warm parts of the day, they stay bedded down in their resting locations.

Reproduction: These animals form monogamous breeding pairs. This means that one male mates and lives only with one female. No evidence for a peak breeding period has been found. Females are known to produce young at any time of the year, with gestation probably lasting 4-7 months. New-borns are well developed at birth and are able to run within a period of twenty-four hours.

Wild pig and Warthogs

Habitat: They are found in a wide variety of habitats ranging from dry arid areas to high mountainous forests and grasslands, to dense rainforest. Wild pigs can live in remote areas and densely populated areas close to human civilization. In order to survive in a given area, they require reliable and adequate seasonally-available forage resources and daily access to well-distributed water, shade and escape cover on a year-round basis.

Figure 7: Common Warthog (Phacochoerus africanus).

Feeding: They are a highly versatile omnivore whose diversity in choice of food is comparable to that of humans. Their foods can be divided into four categories;

- Rhizomes, roots, tubers and bulbs all of which are dug up throughout the year in the animal's whole range.
- Nuts, berries and seeds which are consumed when ripened and are dug up from the snow when abundant.

- Leaves, bark, twigs and shoots along with garbage
- Earthworms, insects, fish, rodents, insectivores, bird eggs, lizards, snakes, frogs and carrion. Most of these prey items are taken in warm periods.


Figure 8: The bush-pig is distinguished by its less colourful markings, coarser hair, and larger size.

Sociality: Wild pigs are social animals typically found in groups of two or more individuals, particularly females. The basic social unit is the sow and her litter, while mature males tend to be mostly solitary.

Behaviour: Because wild pigs cannot cool themselves physiologically, they wallow throughout the year, especially during hot weather in order to lower body temperature and as a protective measure against insects. Wild pigs frequently rub up against both natural and manmade objects. The function of this behaviour is to provide comfort, remove excess mud, remove hair and mechanically rid the body of external parasites.

2.2 Common problems caused by ungulates

Crop raiding

Crop raiding is the most common form of conflict between people and these ungulates. It causes economic, high investment in money and time in the protection of the crops at every stage of crop production. There is further damage to non-palatable, but profitable crops, through hoof action and movements in the crop field.

Transmission of diseases

Transmission of endemic and emerging diseases that filter across the human-ungulates interface such as bovine tuberculosis, foot and mouth to cattle and humans from buffalo; brucellosis infection via the consumption of infected bush-meat root-rot fungus from wild pigs.

Attacks on humans

African Buffalo are known to attack and injure or kill people especially when wounded or when a calf is under attack. They are widely regarded among the most dangerous animals on the African continent. They are estimated to be responsible for more than 200 deaths every year. Warthog's actual attacks on humans are rare, but can be serious, resulting in multiple penetrating injuries to the lower part of the body. They generally occur during the boars' rutting season from November to January, in agricultural areas bordering forests, or on paths leading through forests.

Damage to the environment

Degradation of the environment is the most obvious form of environmental damage caused by ungulates especially migratory buffalos and pigs. When large herds of buffaloes migrate, their trampling effect has adverse effects on bare unprotected soils. They loosen the soils making them vulnerable to erosion which results in siltation of water bodies. As of wild pigs, they induce damage due to rooting, trampling, tusking or rubbing trees and consumption of plants and soil organisms. The rooting behaviour of pigs has been linked to areas of high soil moisture. This rooting behaviour can severely disrupt the composition of the soil's micro-organism and subsequently nutrient cycling. Rooting can also affect disrupt the regeneration of plants, change the composition of the plant community and allow water erosion to occur in drainage areas where the soil has been severely disturbed. Ungulates can physically destroy vegetation by trampling it along their paths.

3 Methods of reducing and mitigating human-ungulates conflict

3.1 Fencing

If they are properly designed, constructed and maintained, fences can be effective in preventing conflict between people and ungulates. They are used to protect crops, people and livestock and to insulate protected areas for ungulates not to interface with humans and their activities. Such a physical barrier that separates wild animals from human activities is the most desirable HUC mitigation measure by communities. Fences also help prevent the transmission of certain endemic contagious diseases such as foot-and-mouth disease, African swine fever and theileriosis. The establishment of control areas, game-proof fences, sanitary cordons and movement control to separate wildlife from domestic livestock has frequently given the best results.

Figure 9: If fences are properly designed, constructed and maintained they are effective in managing ungulates.

Figure 10: Regular maintenance of fences is recommended.

Figure 11: Fences may disrupt wildlife movement patterns, cause habitat fragmentation and mortality.

Although the introduction of fencing is a good way to manage HUC, it also brings a number of environmental and economic disadvantages and is never 100 percent efficient. Fencing of farms has created physical barriers to migratory ungulates such as buffalos. Physical barriers are not always the best economical management practice. They frequently require additional labour from farmers and their family members and never ensure complete protection.

3.2 Community Awareness

Raising awareness on HUC can be carried out at different levels in the community, for instance, in schools or in adult education arenas such as farmer field days. Educating children and adults through the traditional authority of chiefs and related structures is cost effective. Education and training activities could be directed towards disseminating innovative and practical techniques, building local capacity for HUC prevention and increasing public understanding of human-ungulate conflict. Educating rural villagers in practical skills would help them deal with dangerous ungulates like buffalo and wild pigs and acquire and develop new tools for defending their crops. Over time, it would result in a change of behaviour among local populations and would contribute to reduced risks, improvements in local livelihoods and a reduction in their vulnerability.

3.3 Intensifying human vigilance

Vigilance is an important component of crop protection and human ungulate conflict management. Watchtowers providing good vantage points, built around cultivated fields, can increase the farmers' chances of being alerted to the presence of potentially harmful wildlife before damage. Some remotely monitored methods such as simple alarm systems, use of a network of cowbells connected along a length of twine and setting fire on edges of the crop fields can also be used to scare away potential problem ungulates.

3.4 Traditional barriers

Use of traditional barriers such as hedges of spiny cactus, dead thorny branches and stone walls has been widely used in protecting crop fields from ungulates with varying degrees of success. Ungulates such as kudu and impala can easily jump over most physical barriers hence the need to have barriers complemented by other forms of physical deterrence. Each method is effective for protection from a particular species than the other. Different methods can be applied concurrently to increase effectiveness. Warthogs can dig under fences.

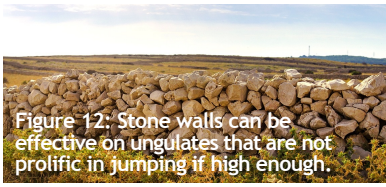

Figure 12: Stone walls can be effective on ungulates that are not prolific in jumping if high enough.

Figure 13: Ungulates such as kudu, impala and eland can be deterred by acoustic techniques.

3.5 Acoustic deterrents

Acoustic deterrents emit unexpected loud noise or specific sounds known to scare wildlife. Traditional acoustic methods include; beating drums, tins and trees; using whips in addition to shouting, yelling and whistling; and setting off explosive devices such as bamboo blasters using calcium carbide or fertilizers, pipe bombs and homemade gunpowder. This method is effective in deterring ungulates such as impala, kudu and eland; animals that are wary of human presence.

3.6 Trapping

Trapping is used mostly for ungulates such as kudu, impala and other small ungulates such as common duiker and wild pigs. It is a flexible technique which can be set along the paths of the animal. Traps can be cheap and designed using home-made material. Communities are encouraged to use trapping methods that are humane and which does not result in environmental damage. Traps come in different types, shapes and designs and can be manufactured according to the target species. However, trapping may not be practical for large scale control. In most communities in the KAZA region, most farmers find it easy dealing with ungulates such as kudu, eland, impala and common duiker.

Figure 14:Box trap.

Figure 15: Round hog trap.

Figure 16: Gate trigger wild pig trap.

Figure 17: Barrel pig trap used in trapping bush pig and warthogs.

3.7 Lethal control of problem animals

Shooting is a method that is widely used in dealing with dangerous problem animals such as solitary buffalos. The method is used whenever human life is in danger or attacks have been made resulting in injuries or deaths. The method is shrouded with balancing the politics of animal rights activists and the sensitivity of the impact the animals will have caused to community if an attempt on life is made or death occurred. Shooting can also be used in mitigating HUC caused by wild pigs. The killing of some animals often has only a short-term effect.

3.8 Increasing alternative water sources

Having separate watering holes for humans and their livestock to those for ungulates can assist in mitigating transmission of diseases and people attacks. The development and creation of new water points reduce encounters between people, livestock and ungulates in the park, and can consequently reduce the levels of conflict.

3.9 Land use planning

The development and implementation of participatory land use plans is important in zoning land use regimes. Land use plans allow for separation of land use activities and minimise conflicts. Areas can be demarcated as wildlife areas, conservancies, communal and commercial lands with specific management styles for each area.

4 Training

Training should be a continuous process for all stakeholders. Various programs of training targeting farmers and extension officers should be executed periodically to improve the technical capacity of the various stakeholders that are responsible to respond to HWC. The understanding of animal behavior and wildlife management, as well as the general awareness programs should be part and parcel of the authorities responsible for wildlife management.

5 Conclusion

It is essential to have accurate spatial and temporal geo-referenced information about when and where the conflict is occurring. This understanding, together with implementation of appropriate mitigation measures, should lead to a better focus on target areas and the most relevant species. Wildlife management and conservation authorities need to understand the HWC hotspots in their respective components and design robust programs for support to the communities against wildlife damages. The support programs should be accompanied by effective support on implementation of mitigation measures, and Monitoring & Evaluation tools. In order to realize positive result in dealing with HWC all stakeholders are requested to ensure that:

- The above interventions are constantly implemented and supported, and not just as occasional campaigns;
- There is greater active participation in the strategic activities by the various parties responsible HWC mitigation;
- There are opportunities to Introduce other innovative mechanisms and approaches on dealing with any type of HWC; and
- Adequate capacity in terms of equipment, skills set, technology, and financial resources are in place to effectively support HWC mitigation.

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