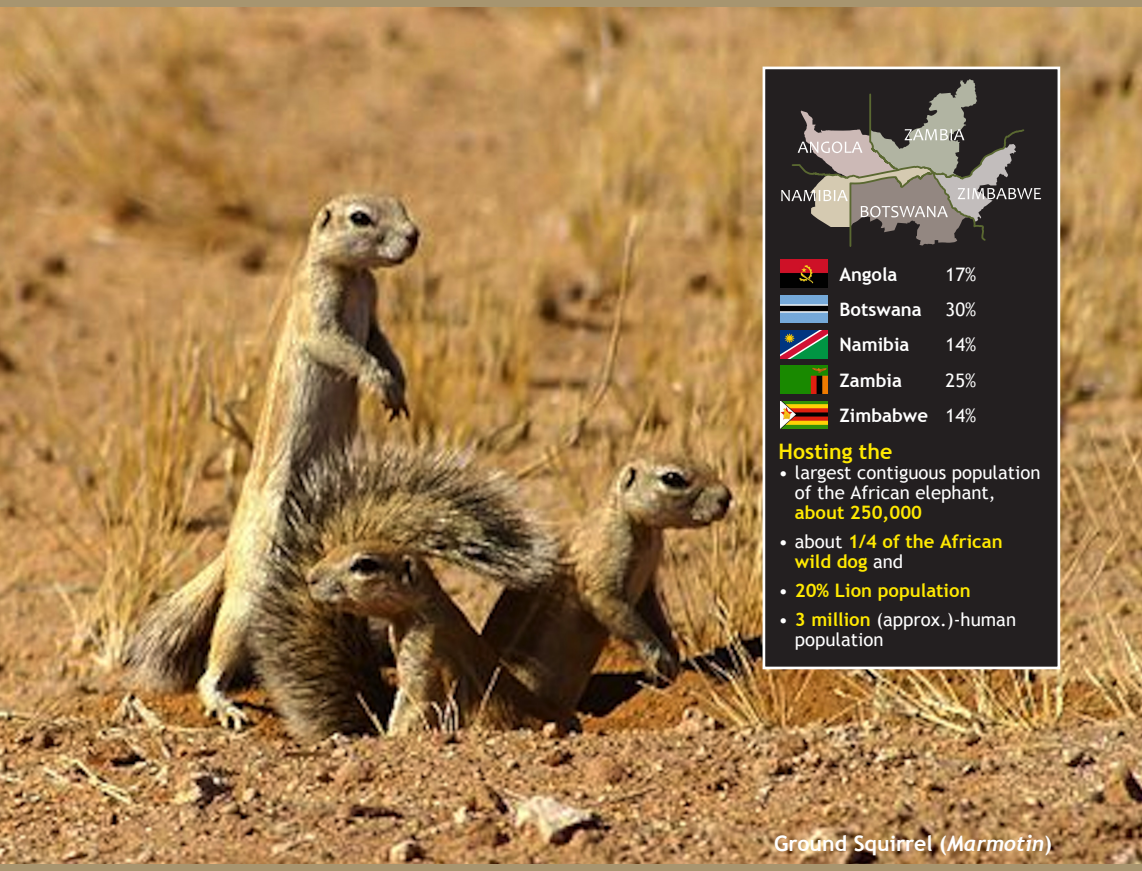
KAVANGO ZAMBEZI
TRANSFRONTIER CONSERVATION AREA (KAZA TFCA)

A MANUAL for REDUCING and MITIGATING HUMAN-RODENT CONFLICT (HRC)



Ground Squirrel (*Marmotin*)

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Abbreviations

HRC	Human Rodent Conflict
HWC	Human Wildlife Conflict
KAZA TFCA	Kavango-Zambezi Transfrontier 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 that are 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 affected communities.

Figure 1: Rodents cause serious damage to staple food crops in the KAZA TFCA.

Human-Rodent Conflict (HRC) is fast becoming a serious threat to the survival of rodents. Across the KAZA landscape rodents are found in a wide range of environments ranging from natural sites underground to human created environments such as crop fields, urban centres and homes. Due to the rodents' ability to adapt in many macro and micro-habitats, contact with human society is inevitable which results in conflicts. The HRC manifests in various forms that include damage and destruction of property, agricultural produce and transmission of diseases. Resultantly, there is wanton poisoning and killing of rodents as pests.

In order to mitigate the undesirable outcomes of the interaction of humans and rodents, it is imperative for KAZA TFCA stakeholders to have information on ways of mitigating human-rodent conflict as a strategy to harmonious coexistence of people and rodents. This manual provides information on methods of reducing and mitigating human-rodents conflicts.

1.1 Goal of the manual

The goal of the manual is to:

- Improve the understanding of conflicts between humans and rodents in order to assist the affected communities in applying best practice management to reduce and mitigate the conflicts.

1.2 Objectives of the manual

The objectives of this manual are to:

- To equip communities with knowledge on human-rodent conflict.
- To assist communities to understand and apply best management practices in reducing and mitigating human-rodent conflict.

1.3 Targeted users of the manual

- Farmers (subsistence and commercial) experiencing and affected by human-rodent conflicts.
- Wildlife managers and extension officers.
- Stakeholders interested in coexistence of human and rodents.

2 Human and rodents conflicts

Rodents remain one of the main nuisances to humans. For thousands of years they have been causing damage to crops, stored grain and infrastructure and are reservoirs for devastating human diseases such as plague and typhus. Today, rodents continue to cause serious damage to staple food crops such as maize, sorghum and millet in KAZA TFCA despite advances in methods of control and management techniques. The common distinguishing characteristic of rodents which enables them to be a nuisance to humans is a single pair of continuously growing teeth (incisors) in each of the upper and lower jaws which they use to continuously bite food, excavate burrows and defend themselves.

Despite being largely a nuisance to humans, rodents have many important ecological roles. Some of the ecological roles include soil mixing and aeration, seed and spore dispersal, influences on plant species composition and abundance and serving as a prey base for many predators. Furthermore, they make a substantial portion of wild game consumed by humans in many areas including in KAZA TFCA.

Figure 2: Mice are considered a delicacy in some communities of the KAZA TFCA.

1.2 Behavioural traits of rodents

Habitat adaptability

Rodents occur in every habitat, from the coldest to the hottest and driest regions. Others glide from tree to tree (flying squirrels), others live completely underground where they build complex burrow systems, others live on the ground but having a burrow into which they can hide, others live in water while others live in human created environments such as crop fields, urban centres and homes.

Feeding

Rodents have a wide range of diet as they consume all sorts of plant materials, primarily seeds, leaves, stems, flowers and roots. They also consume insects, spiders and worms. A few are well known meat eaters who feed on small fish and frogs.

Digestion

Their digestive system is very efficient as they assimilate 80% of the ingested food. Rodents practice coprophagy (they eat their own faecal pellets so that they absorb all the nutrients in their gut). This is the reason why they produce a hard and dry faecal pellet.

Teeth

All rodents have pairs of continuously growing, razor-sharp, open rooted incisor teeth. Because they do not stop growing, rodents must continue to wear them down so that they do not reach and pierce the skull. With these teeth, they can gnaw even hard materials.

Senses

In general, rodents have well developed sense of smell and touch but poorly developed eye sight. They have excellent light sensitivity but poor ability to hear, see or think accurately and clearly. They are colour- blind. Rodents are intelligent and can master simple tasks for obtaining food. They can be readily conditioned and easily learn to avoid fast acting poisoned baits, a factor that makes them difficult pests to control.

Breeding

Rodents reproduce in abundance; they multiply rapidly under favourable conditions. A female rat may give birth up to five litters of 7 – 8 young ones in its life. They also have short gestation periods and short duration of sexual maturity. For control of their populations, it is important to understand the factors that influence the starting and ending of breeding and changes in abundance so that mitigation actions can be taken at an appropriate time. Despite being prolific breeders, rodents have a very short lifespan.

Neophobia and neopholia

Many rodent species have a fear of new objects and will avoid them (neophobia). Other rodent species are inquisitive and will explore new objects and foods in their environment (neopholia). Knowing this is very important when mitigating HRC by baiting and trapping.

2.2 Common problems caused by rodents

Transmission of zoonotic diseases

Rodents living in close association with humans have been found to be vectors of pathogens and diseases such as hanta-viruses, lungworms, rat typhus, leptospirosis, salmonellas, fowl cholera and bubonic plague. Some of the diseases such as leptospirosis are known to be more prevalent in subtropical regions, particularly in the communal areas and on farms where there is limited sanitation facilities and poor animal handling techniques. Diseases are spread directly through rat bites or humans eating infected rat meat and indirectly through eating contaminated food infected with rodent excreta with pathogens.

Damage and destruction of property

Due to their biological make-up, rodents' incisors continually grow. In order to keep their rapidly growing incisors short and sharp enough for regular use, rodents persistently bite human property. In this process they damage and destroy merchandise both stored and in transit. They also cause huge damage to buildings by gnawing wood, pipes, walls, foundations and start fires by gnawing insulation on electrical cables.

Agriculture pests

Rodents are known to damage and destroy about 30% of the crops during pre-harvest periods. Most damage occurs during the sensitive young seedling stage and just before harvest. However, the actual pattern and levels of rodent infestation and the extent of damage vary in crop variety, geographical location, the species involved, length and method of storage and the climatic conditions. Also rodent populations can explode in human affected landscapes because natural predators such as snakes and birds have been extirpated.

3 Methods of reducing and mitigating human and rodents conflicts

3.1 Trapping

This is a physical HRC mitigation method which is widely used for removing rodents. These include wire and kill traps. Traps need to be either attractive to rats via placement of attractive bait or set along runways. The effectiveness of physical trapping depends on the behaviour of the species. Other types of traps are live and multiple capture cage traps. Resourceful farmers are known to invent an amazing array of trapping devices such as snaring devices or buckets of water with a slippery surface so the rodents fall into the bucket and ultimately drown.

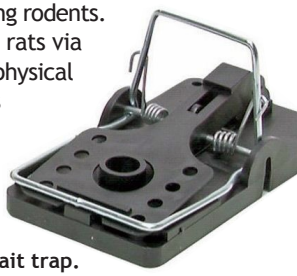

Figure 3: Snap bait trap.

3.2 Physical Barriers

Physical barriers can be built around small areas to protect crops. Plastic barriers have been used successfully for nursery horticulture and rice to protect the seedlings from rodent attack before they are planted out in the field. Plastic barriers have also been used around rice fields but they require regular maintenance. However, some species are excellent climbers so barriers are not always effective for all rodent species.

3.3 Trap-barrier system

This is a special type of a physical HRC mitigation measure. It was first applied as fences plus traps where rodent populations had built in fallow land adjoining crop fields. It was then modified to include a trap crop that attracts rodents which is planted 2-3 weeks earlier than the surrounding fields and thus is slightly more attractive than the surrounding fields. Then multiple capture traps are placed inside the fence along the sides to capture rodents trying to access the 'trap crop'.

Figure 4: Common mouse trap.

3.4 Hunting

There are various forms of hunting used; use of bows and arrows, locating active burrows and digging with the aid of dogs in catching the rodents when they run out of the burrows, pour water in the burrows and either catch or hit the rodents as they emerge from the burrows and driving rodents out of the fields as farmers make noises while in a line across the crop field.

3.5 Habitat manipulation

This is another type of physical mitigation measure of HRC. This involves treating non-crop areas that are sources of habitat for rodents, often undisturbed weedy areas which provide burrows and nesting sites. This can be managed by slashing the weeds to reduce nesting habitat and increase predation risk. This should be taken as one of the main rodent control measures.

3.6 Acute rodenticides

This is a chemical based HRC mitigation method. Acute rodenticides cause death from minutes up to 24 hours of ingestion. This can be applied in field situations. The chemical comes as a grey or black powder that needs to be mixed with a bait substrate. It is used mixed and coated onto grains such as broken millet, sorghum, rice or maize. It has a garlic odour and is toxic a wide range of rodent pests.

3.7 Anticoagulant rodenticides

Another chemical based HRC mitigation method normally used in warehouses, grain stores and houses. These were developed to overcome bait shyness and they work by blocking the recycling of the active form of vitamin K that is essential for blood clotting. The animal dies of internal bleeding (haemorrhage) several days after ingesting the rodenticide.

3.8 Fumigation

Another chemical based HRC mitigation method where burrows are gassed using granules of sulphur mixed with straw of grain crops. This is done using a hand operated fumigation device, set alight and then air is pumped through the chamber by turning a hand pump and the smoke gets pumped into the rodent burrows. Other fumigants include pellets or granules containing aluminium or magnesium phosphide which are inserted into rodent burrows and sealed with mud.

3.9 Sterility control

This is a bio-control based HRC mitigation method. One of the mitigation measures for human/rodent conflict is the use of chemicals designed to reduce the ability of rodents to reproduce in abundance. This will resultantly reduce the rodent populations thereby minimising losses attributed to high rodent densities in agricultural produce, reduce risks of transmission of zoonotic diseases and control damage to property.

3.10 Rodent proofing

This involves construction of rodent proof grain stores after harvest in order to limit rodents' access to grain is traditional mitigation measure for human/rodents conflict that is widely practised. It is important to thoroughly inspect the exterior and interior of grain stores and homes so that if there are any openings or cracks, they can be sealed with any ideal substance. This will help prevent rats from squeezing or gnawing through the spaces.

3.11 Diversionary feeding

Diversionary feeding could be used in a situation where high value produce could be protected by providing an alternative feed source.

3.12 Prevention

At homes, store piles of firewood not too close to the houses since rats like to nest in wood piles. Moving firewood further from the houses makes it harder for rats to get inside your house. Install door sweeps on all exterior doors so that even the smallest rats cannot squeeze into the house. Keep items in the storerooms, agricultural sheds and garages well organized. Dispose garbage promptly into well dug pits and rubbish bins which should be located away from houses.

Figure 5 & 6: Rodent removal cages.

Figure 7: Rodent droppings can reduce the grade and quality of harvested cereal yields.

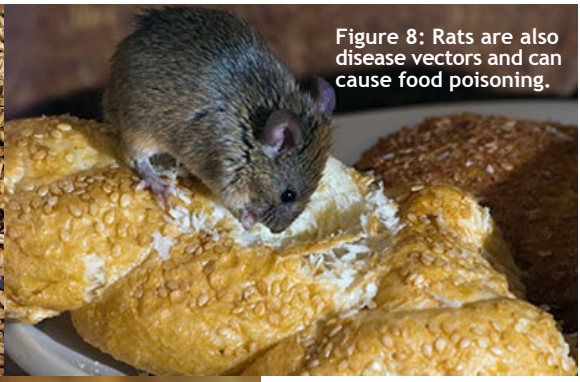

Figure 8: Rats are also disease vectors and can cause food poisoning.

Figure 9: As carriers of pests, rodents bring along fleas, mites, and ticks with each infestation.

Figure 10: Rodent meat is seen as a sustainable way to feed the world as some are rich in protein.

Figure 11: Rats and mice have been used for medical research for a long time.

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.

Training, demonstration and publicity programmes on scientific preservation of food grains and pest control techniques should be given high attention in order to reduce and mitigate human/rodent conflict. The post-harvest management of grains in many of these areas is extremely poor and much is lost- a great deal could be gained by looking at the issue as a food security problem.

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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