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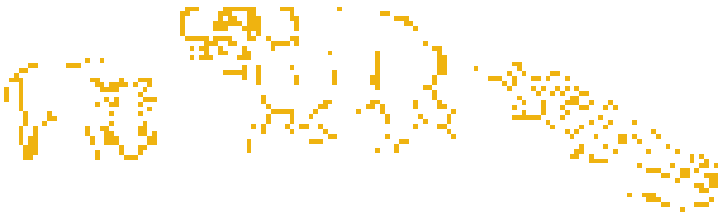
human wildlife conflict manual

WILDLIFE MANAGMENT SERIES



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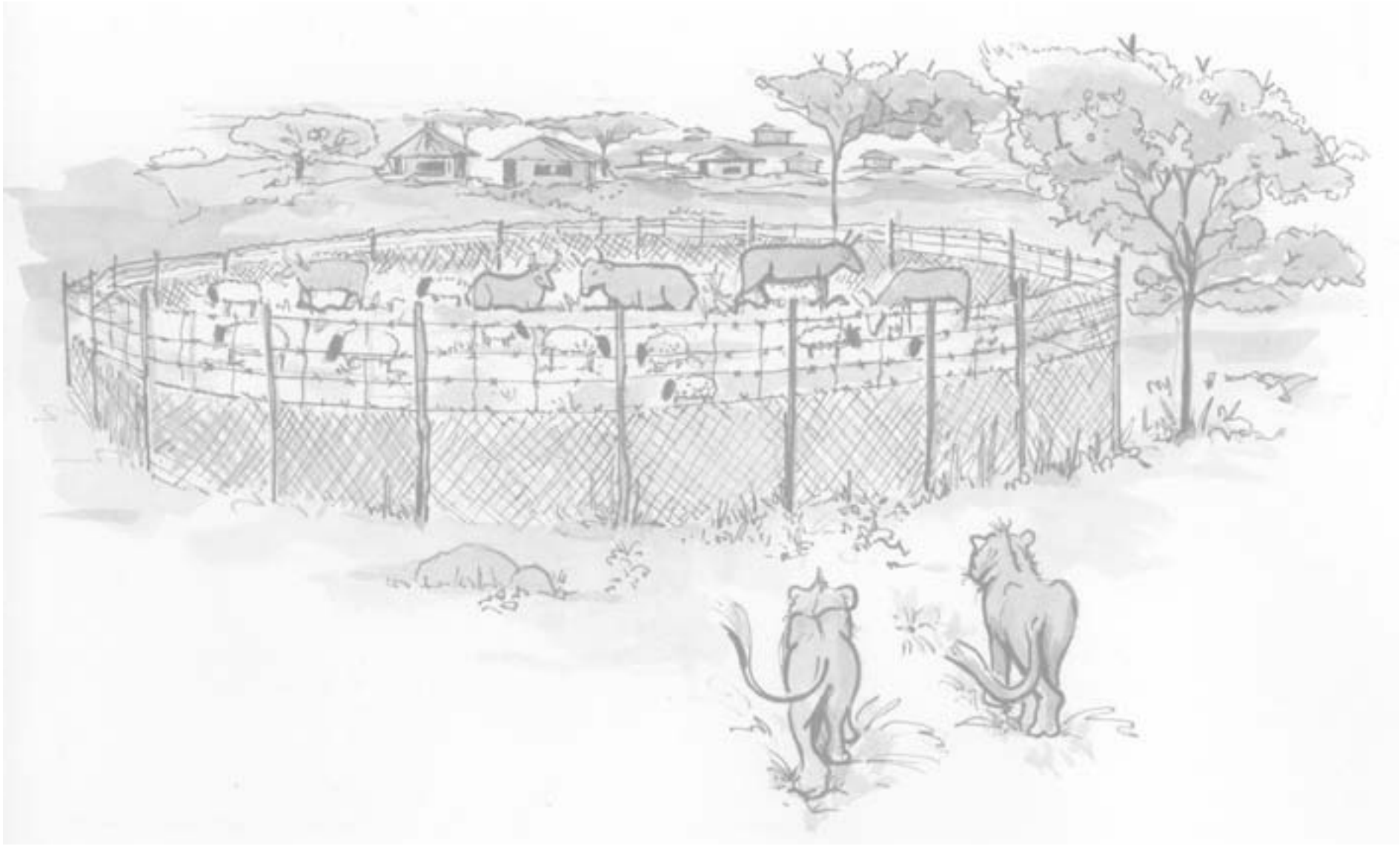


Lions are one of the key predators in human wildlife conflict

INTRODUCTION TO THE MANUAL

What is the objective of this manual?

In community-based natural resource management (CBNRM) programmes, local communities are co-managers of wildlife and earn direct benefits from wildlife. In such programmes conflict between people and wildlife is a frequent and ongoing problem. The expansion of human settlements into wildlife areas means that human-wildlife conflict is growing in many parts of Africa. In order to be successful and sustainable, wildlife-based CBNRM programmes have to address this conflict.

This manual is designed to guide local communities, wildlife managers, policy makers, and other people involved in community conservation, in ways to reduce human-wildlife conflict. It provides some background on the problem and gives specific examples of methods used to reduce human-wildlife conflict in Southern Africa. Examples from Botswana, Mozambique, Namibia, Zambia and Zimbabwe are supplied, where available, to demonstrate some of these options.

How is this manual organised?

In addition to the Introduction, this manual comprises the following chapters:

Chapter One:	Background to Human-Wildlife Conflict
Chapter Two:	Institutional Arrangements in Human-Wildlife Conflict
Chapter Three:	Information on the Problem of Human-Wildlife Conflict
Chapter Four:	Lessons on Reducing Human-Wildlife Conflict
Chapter Five:	Country-specific and Local Level Problem Animal Control Options
Chapter Six:	Taking Action and Evaluating Effectiveness
Appendix One:	Glossary of Terms
Appendix Two:	Contact Details of Relevant Organisations

In Appendix 1 there is a Glossary of Terms which explains the technical words used in the text. Appendix 2 lists the contact details of organisations that can assist in the development of guidelines for managing human-wildlife conflict.

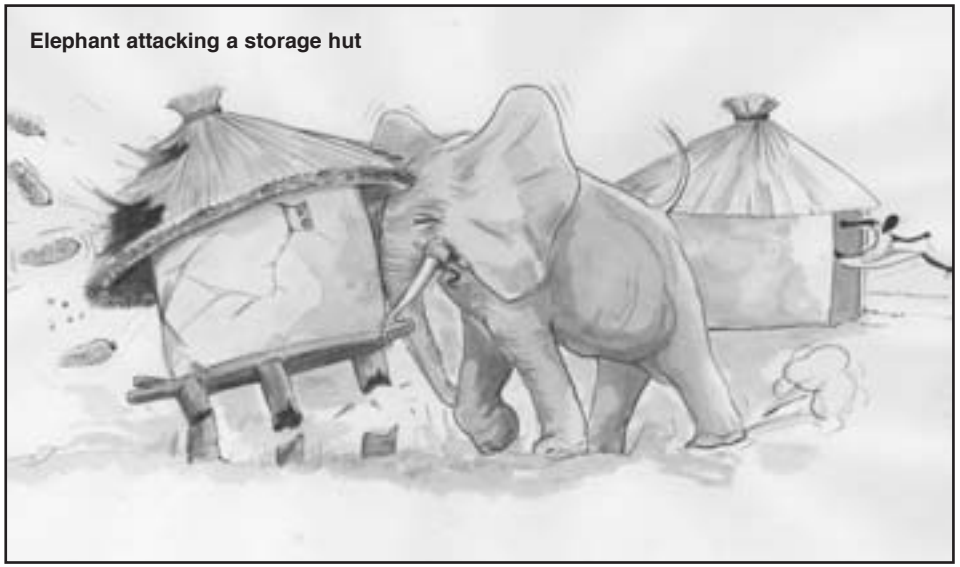
BACKGROUND TO HUMAN-WILDLIFE CONFLICT

What is human-wildlife conflict?
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."

What is a "problem animal"?
Care is needed when defining the term "problem animal". Potentially, all wildlife species will compete with humans for access to habitat, food and water. For example, elephants will feed on maize crops because they are grazers/browsers, and lions will kill and eat livestock because they are predators. However, some individual animals may develop habits which select or target crops and livestock. An elephant bull may repeatedly return to a cultivated field or a lion may regularly visit a boma, despite the protective measures in place. Such individual animals can be classified as "problem animals" since they have become specialised in habitually targeting the property of people.

Who suffers directly from human-wildlife conflict?
Both people and wildlife can suffer from human-wildlife conflict. Farmers suffer economically from the loss of crops and livestock. In other more serious cases, people are killed. However, the overall impact of human-wildlife conflict tends to be low when the losses are spread over a whole community. The people who suffer most tend to be those living on the edges of settlements and those living close to community or state-managed wildlife areas. On the other hand, for animals, some wildlife populations may decline or become locally extinct as a result of extensive human-wildlife conflict.

Elephant attacking a storage hut



What are the direct costs of human-wildlife conflict? Direct costs to humans are the financial, social and cultural losses suffered as a result of human-wildlife conflict. Examples include:

- Raiding and destruction of food crops;
- Loss of income from sales of produce from cash crops;
- Damage to water sources and installations;
- Damage to stored produce;
- Loss of livestock;

- Human injury or death;
- Damage to property (buildings, etc).

The costs to wildlife include the loss of habitat, persecution and possible population decline.

Who suffers indirectly as a result of human-wildlife conflict? Members of local communities that live with high levels of human-wildlife conflict often suffer from a sense of insecurity. This might be due to the anxiety of potential losses that they can suffer or from the worry of physical threat to their lives and property.

What are the indirect costs of human-wildlife conflict? The indirect costs of human-wildlife conflict are generally associated with the physical threat of living with large mammals. This has the effect of restricting people's freedom of movement, for fear of running into such animals, or restrict their access to resources such as water, firewood and grass for thatching.

There are also indirect costs of guarding property against wildlife. Preventing damage to crops results in the reduction of sleep and often a higher exposure to malaria. This can cause a loss in productivity and opportunities to pursue other economic activities.

The indirect costs to wildlife itself generally occur because people do not adopt a systematic approach to the conflict. They possess negative attitudes towards wildlife which can lead to the indiscriminate killing of animals or to increased and unsustainable hunting. Growth of communities means a loss of habitat for wildlife, restriction
of their movements and blocking of access to traditional watering points.

Lookout hut/tower in middle of field

Which wildlife species are generally responsible for human-wildlife conflict?

Surprisingly, small animals, that pose no obvious threat to humans, can be responsible for devastating damage to crops. These animals include insects, such as locusts and caterpillars, birds, such as seed-eaters and fruit-eaters, and rodents, rats, springhares and porcupine, for example. Small animals, like primates (baboons, vervet monkeys), some antelope species, bushpigs and even the smaller carnivores (genets, servals, mongooses), can also cause major losses to crops and livestock.

Troop of baboons raiding a maize field

However, it is the larger herbivores (elephant, buffalo and hippopotamus), large carnivores (lion, leopard, cheetah, spotted hyaena, wild dog), and the crocodile that are traditionally defined as problem animals and are responsible for most of the human-wildlife conflict. This is because farmers often feel that the large animals are the property of the government, as was the case under previous colonial legislation, and, therefore, that they are not allowed to deal with the problem themselves. For insects and small animals, however, farmers use local solutions where possible.

Why is it important to address human-wildlife conflict in CBNRM programmes?

CBNRM assumes that local communities will be willing to conserve, manage and live with wildlife only when the benefits they derive from the wildlife outweigh the costs. It is important to remember that individuals generally have to bear the direct costs of human-wildlife conflict, whilst the community, as a whole, receives the benefits. The needs and expectations of the entire community, including the individuals that bear the brunt of the costs, must be taken into account when developing solutions to human-wildlife conflict. This is vital to the success and sustainability of CBNRM programmes. It is important to remember that there will always be some degree of human-wildlife conflict. Insects, birds and small mammals are found in even the most densely settled areas in Southern Africa. **Where the challenge lies is in balancing the costs and the benefits when it comes to dealing with large mammals so that people will live, manage and directly benefit from this form of land use.**

INSTITUTIONAL ARRANGEMENTS IN HUMAN-WILDLIFE CONFLICT

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 a combination of options is needed. ***To be sustainable, such options should match the financial and technical capabilities of local communities and the individuals responsible for its implementation.*** The options available will partly be determined by the institutional arrangements or policies found at national, regional and local level.

Why is it important to have a policy on human-wildlife conflict? Wildlife can be a valuable natural resource for rural communities. To yield the maximum benefits it needs to be managed, part of which includes reducing human-wildlife conflict. Clear policies on dealing with human-wildlife conflict help set the options that can be implemented by farmers and communities.

In order to be effective, policies need to include:

- A clear definition of the roles of the community and the authorities responsible for wildlife;
- Guidelines on human-wildlife conflict and the means to measure the extent and nature of such conflict; and
- A distinct definition of a "problem animal".

Transparent and workable policies on managing human-wildlife conflict lead the way to sound legislation and contribute to the success of CBNRM programmes.

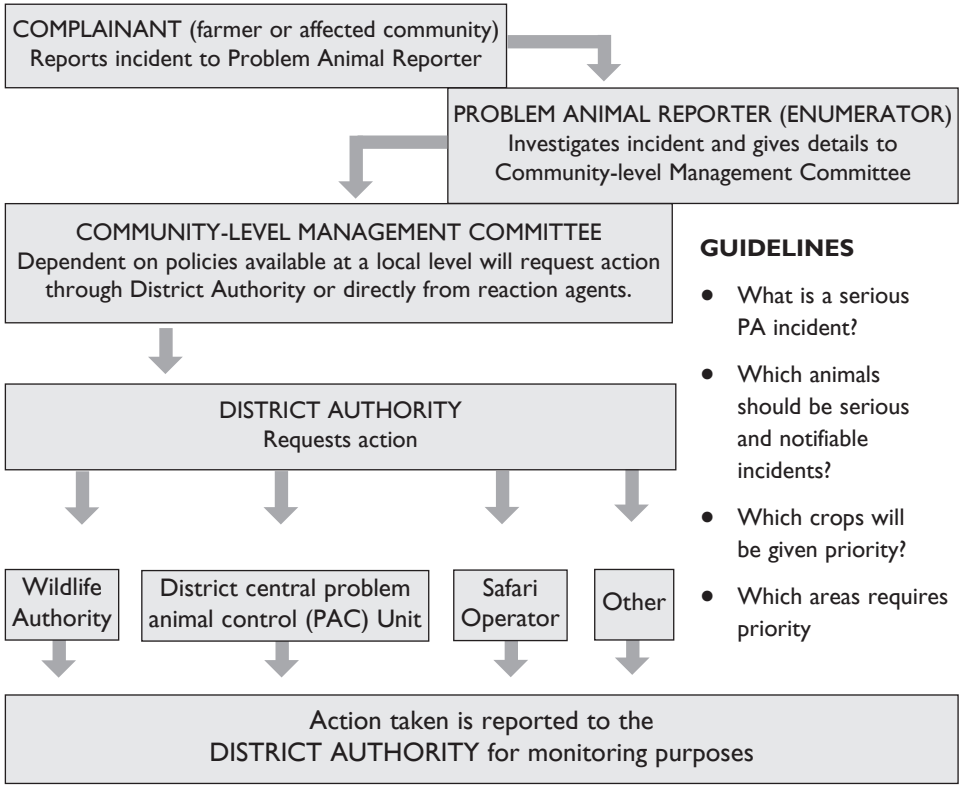
Who determines policy at national and local levels?
Historically, the government department responsible for wildlife and the environment, developed and implemented policies. With the CBNRM approach, local communities became involved in developing and implementing policies on human-wildlife conflict and managing "problem animals" with the help of the appropriate government departments.

Defining "problem animals" and the appropriate "problem animal management actions" should be determined at local community level, by the community-based organisation in partnership with the relevant government representatives. Discussions should also include any private sector hunting or tourism operators within the area. Questions relating to the costs of any actions agreed upon should be raised. It is important that the affected farmers have a sense of ownership and that they have some power to address the problems.

What guidelines should be followed in the event of human-wildlife conflict?

In the event of an incident with a wild animal, there must be a policy that people can refer to for direction on the most appropriate action to take. If there are no guidelines then communities are in danger of taking action independently, which could result in greater losses in the long term. Any system for the reporting of incidences and the development of appropriate action, should, ideally, have been agreed upon by all stakeholders.

The diagram below is an example of a framework that can be used as a guideline to develop a decision-making process for managing human-wildlife conflict.



What is the relationship between central wildlife authorities in the region and local communities?

The table below shows the roles and responsibilities of the different stakeholders in the field of human-wildlife conflict (HWC), in the region.

Country	Wildlife Authority		Private sector	NGOs	Communities
Botswana	DWNP	Have the legal mandate for overall management of wildlife. Develop policies, policy changes and legislation. Final decisions on human-wildlife conflict reduction issues rest with the wildlife authorities.	Safari operators may interact with communities on an advisory level or as reaction agents to reduce HWC.	Can influence policy through provision of information and research for use in policy development. May interact with communities on an advisory level and skills development	Feed information on "problem animals" to local authorities (Rural District Councils in Zimbabwe, Communal Conservancies in Namibia have authority to take action on conflict reduction). May make use of bylaws to deal with smaller "problem animals".
Mozambique	DNAC DNFFB				
Namibia	MET				
Zambia	ZAWA				
Zimbabwe	PWMA				

Reliable information on human-wildlife conflict and "problem animals" is vital for the development of sound policies and relies on accurate reporting of temporal and spatial data by all parties concerned.

What are the potential areas of disagreement between stakeholders?

Government wildlife departments or authorities and community representatives might find it difficult to agree on policies and actions to deal with human-wildlife conflict. Setting up an effective system for problem animal management needs understanding from all sides. Differences may arise because of a lack of:

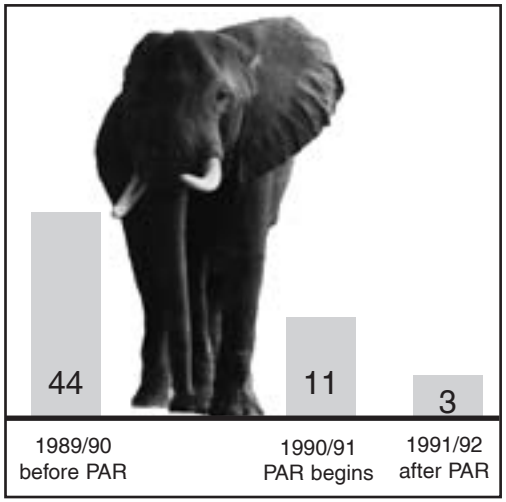
- **Information:** Wildlife authorities are used to managing wildlife in protected areas, they do not always appreciate the problems that farmers face in communal lands. This is why it is so important that farmers and communities collect information that shows the scale of the problem.
- **Capacity:** Communities are relatively new wildlife managers. Frequently wildlife authorities do not believe that communities of farmers have the skills to assist with problem animal management. Communities and the organisations that assist them can overcome this by designing appropriate and relevant training courses. It is important that these courses build on the skills of the farmers and are not seen to be irrelevant.
- **Investment in problem animal management:** Communities are often very eager to get the financial benefits from wildlife, but are reluctant to invest their own money in the activities and infrastructure that will reduce the problem. Communities can build goodwill with the authorities and reduce their own problems by investing in activities that will help reduce human-wildlife conflict. e.g. Communities in Guruve, Gokwe in Zimbabwe have invested in PAM by employing community Problem Animal Reporters and Game Guards.

INFORMATION ON THE PROBLEM OF HUMAN-WILDLIFE CONFLICT

The previous chapter stressed the importance of the availability of working policies and the development of good relationships between the key stakeholders in any human-wildlife conflict situations. Both the design and implementation of such policies are dependent on the availability of current and accurate 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.

Why is information important?
In the absence of good information, the scale and nature of human-wildlife conflict becomes a matter of personal opinion. 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 order to make informed and cost-effective management decisions, information on problem animals needs to be:

Number of elephants killed in Gokwe



Gokwe, a CAMPFIRE RDC in Zimbabwe, reduced number of elephants killed in PAL by collecting PA information hence making informed decisions.

- **Current:** good policies can only be developed when the information is up-to-date. There is little point in basing policy on information that is several seasons or years old. However, it is also important to collect information from a number of years in order to take into account changes that may have occurred.
- **Accurate:** when information is collected it must be correct. Where information is collected over several years then the method for gathering information should remain the same so that an accurate assessment of the trends over time can be made.
- **Long-term:** even when a policy has been developed and measures implemented to reduce the conflict, it is important that the information continues to be collected. This will show the stakeholders how effective their intervention has been. Too often people stop collecting data on human-wildlife conflict before the effectiveness of the measures introduced can be assessed.

What are the sources of information on human-wildlife conflict?
All the stakeholders in a human-wildlife conflict situation need to provide information. Each has an important role to play:

- **Farmers:** also known as the "complainant", farmers provide information on any human-wildlife conflict incidences, the nature and frequency of occurrence and the estimated cost of any damage. This information may be channelled through trained enumerators or problem animal reporters.
- **Community-based organisations (CBOs):** CBOs collect, analyse and store information on problem animal incidents. Too often CBOs start collecting the information, but it is seldom analysed and often lost. Data collected by CBOs should be passed on to the relevant local authority or national wildlife authority.
- **Private sector:** Depending on the nature of their contract, they may undertake action to reduce human-wildlife conflict.
- **Non-governmental organisations (NGOs):** They collect and analyse information as well as conduct research and report findings on human-wildlife conflict. Any information collected should be passed on to the relevant local authority or the national wildlife department.
- **Wildlife departments:** are responsible for the development of national wildlife policies and legislation. Based on the information supplied to them by stakeholders, wildlife authorities should be in a position to compile national statistics on human-wildlife conflict, which show trends of human-wildlife conflict, the important areas of conflict, the major species involved and the success of different measures that have been used to try to reduce the conflict.

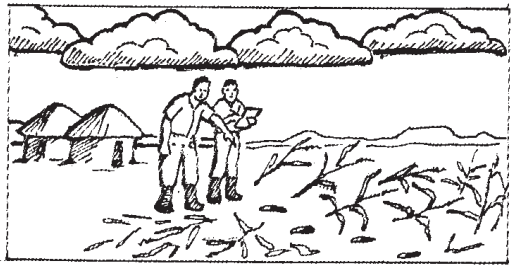
What information needs to be collected?
It is always tempting to collect too much information. Information systems for human-wildlife conflict must try and gather the key information that will be useful for resolving the problem. It is important that the data is collected consistently and can be analysed over a period of time. The following basic facts need to be gathered about incidents of human-wildlife conflict:

1. Who suffered the damage;
2. What was damaged;
3. Where the incident occurred;
4. When the incident occurred;
5. The wildlife species and, where possible, the age, sex and group size of the animals responsible;
6. What was the extent of the damage.

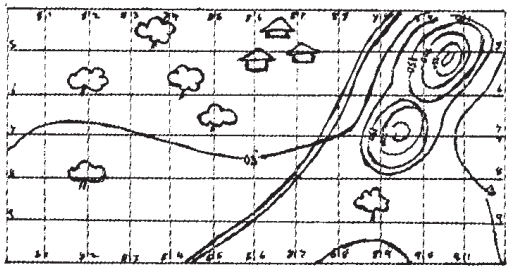
(For further details on this please refer to the WWF-SARPO manual on Problem Animal Reporting).
Points 1 to 5 are factual and can, therefore, be collected with relative ease. Point 6, however, relies on value judgement and can be subject to bias. Accurate and consistent information on human-wildlife conflict can really only be collected by using trained reporters or enumerators. This will ensure that the information is collected using the same approach for each incident. The disadvantages of using reporters are the costs and possible delays that can be involved.

What should be considered when setting up a system to gather information on human-wildlife conflict? There are some important decisions to make when setting up a system to collect, analyse and report on human-wildlife conflict. The most important areas to consider are:

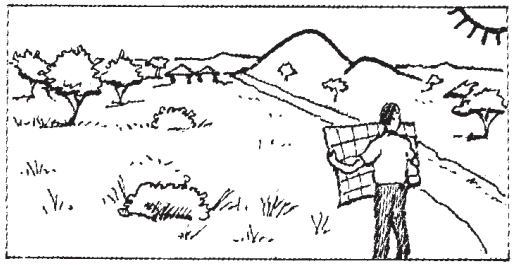
- **Purpose:** It is crucial that the purpose of the system is very clear as this will affect its design. Most systems should be planned to allow CBOs and local farmers to reduce human-wildlife conflict. Other systems may, however, be developed to investigate the conflict with a long-term objective of designing appropriate technology and policy interventions in the future.
- **Ownership:** It is vital to establish who controls the system. If the system is to be locally owned, then it cannot be imposed. The facilitators of the system, those responsible for initiating the information gathering and getting information into the system, must work with the affected farmers and community-based organisations to ensure that their interests are fully represented.
- **Analysis of information:** Collection of information alone will achieve very little. It is essential that any system allows for the storage and analysis of information as well as the reporting back of any findings. The methodology of analysis must take into account the skills and technology available at a local level. It is very important that any analysis shows the trends in human-wildlife conflict within a defined area. One of the best methods of collection, analysis and storage of information on wildlife is the Event Book system developed in Namibia. The details of this system are provided in Chapter 6.
- **Enumerators:** The long-term, systematic collection of information on human-wildlife conflict needs a team of trained enumerators (also know as "problem animal reporters"). A system that is based on voluntary reporting by farmers will not come up with the necessary information. Using enumerators means that the following questions need to be considered:
- **Training:** In the short-term the enumerators need to be trained in the information collection methodology, such as animal damageassessments, map reading, navigation and importance/value of NRS. This immediately raises the



animal damage assessment



map reading



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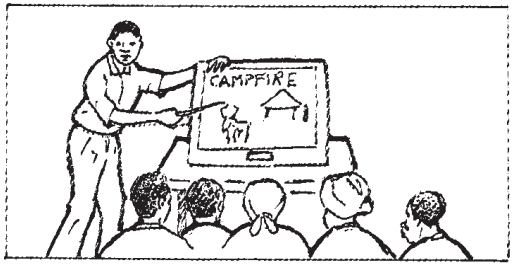


natural resource management

question of who to select. Experience has shown that facilitators should work with the CBOconcerned to establish the skills that are needed and then jointly select the enumerators. Ideally, the training should be supported by close monitoring and follow-up. While this may seem expensive it is the only way of ensuring that the enumerators have the right skills and understand what is required of them. The facilitators of the system must be aware that there will be a high turnover of enumerators and that they must put in place a strategy for ongoing enumerator training, with the community. In nenyunga, Gokwe PAR train each other using the WWF PAR Manual.

- **Employment:** The long-term success of an information system will depend on who employs the enumerators. Ideally, the enumerators should be employees of the CBO. However, the recording of human-wildlife conflict incidences is generally seasonal. The CBO must then decide how long to employ the enumerators for. Alternatively, the enumerators may be employed in other roles when the level of conflict is lower.

- **Coverage and transport:** The area to be covered singly and collectively by enumerators must be realistic. This will depend on the mobility of the enumerators, the intensity of the conflict and the settlement patterns (Fig 1-3). Facilitators should aim to set up a decentralised recording system. This has the advantage that it will be equally accessible to all farmers. (e.g. have a resident enumerator for each ward/village)

Figure 1: When settlement & agriculture is next to a "protected area"

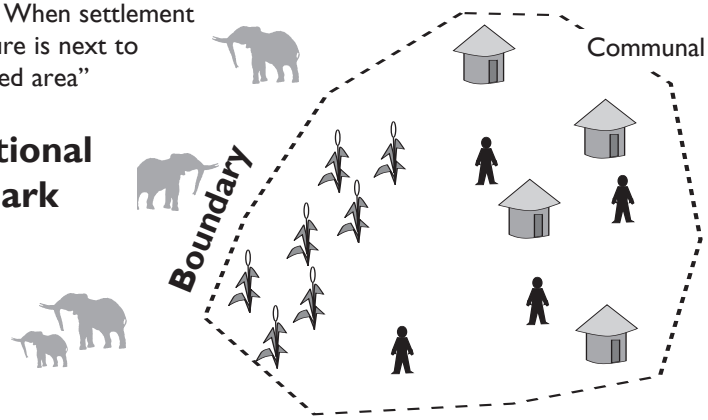


Figure 2: Settlement is isolated within a communal wild life area

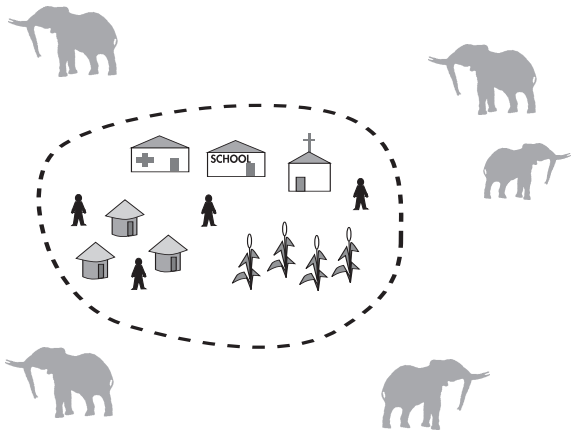
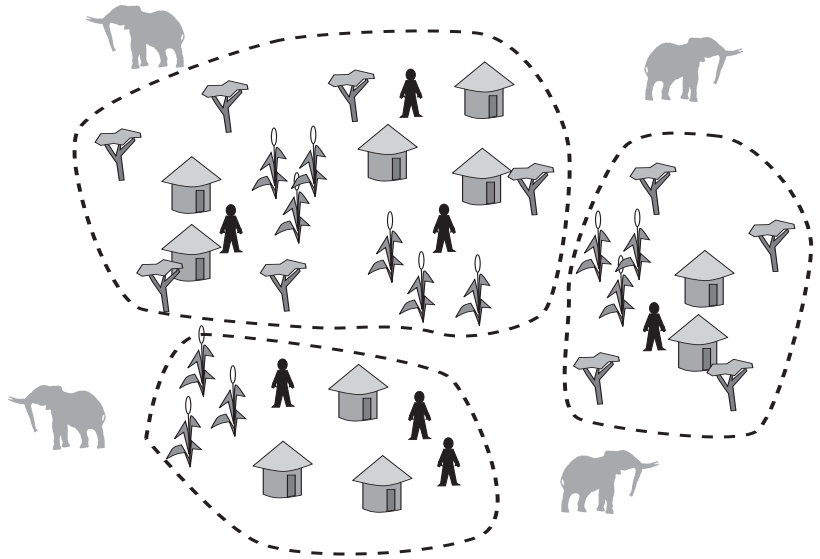


Figure 3: Settlements are expanding and joining together, fragmenting a wildlife habitat



What other important decisions need to be made when setting up an information gathering system? Discussions should be held with the local community in order to agree answers on the following important issues:

- Who will pay the enumerators;
- Who will pay for transport and equipment
- Agree on the definition of a "problem animal" and have concensus on the present policy on managing human-wildlife conflict;
- Which areas will be covered by the enumerators (part or all); and
- Trainers and enumerators
- Whether enumerators should be employed throughout the year or only seasonally.

What are the major steps in setting up a system to gather information on human-wildlife conflict?

It is necessary to implement mechanisms that will "filter" incoming data and ensure that the information is:

(i) accurate

(ii) complete, and

(iii) reasonably free of bias.

(Please see the manual on Problem Animal Reporting for full details.)

The following steps can be taken:

1. All parties agree on information collecting methodology.
2. Appoint supervisor to administer the reporting scheme;
3. Recruit enumerators - agree conditions of employment, assign to different areas to achieve as full as possible coverage of the "conflict zone";
4. Train enumerators;
5. Supervisor to monitor and evaluate work of the enumerators;
6. Supervisor to submit regular summaries of "problem animal" information to CBO and /or wildlife authority;
7. Wildlife authority to analyse data and make informed decisions on managing human-wildlife conflict;
8. Wildlife authority to give feedback to affected community/communities.

Issues to consider in PA definition and local level policy on HWC for enumerators

- What is a serious PA incident
- Which animals will be considered as serious and notifiable incidents
- Which crops or livestock should be given priority when requesting reaction
- Which channel/ reporting command will be used

LESSONS ON REDUCING HUMAN-WILDLIFE CONFLICT

Introduction
Over the last twenty years many important lessons have been learned about managing human-wildlife conflict. Importantly, there is no single solution and a variety of options need to be developed and tested at a local level. This chapter reviews some of the most common methods used to reduce human-wildlife conflict and looks at the advantages and disadvantages of each. The information presented should be considered as a guide to how human-wildlife conflict might be addressed. Implementation of a selected option or options will require information and guidance beyond what can be offered in this manual.

What are some of the main methods for reducing human-wildlife conflict?
A list of the most common methods used for reducing human-wildlife conflict is outlined in the table overleaf. One of the most successful methods, however, has been introduced under the CBNRM programmes in the form of land use planning and land use change.

What are land use planning and land use change?
Land use planning and land use change are larger scale methods aimed at creating space for people and wildlife to live together. Land use change refers specifically to the management options that change farmers' attitudes to wildlife. The most successful way to do this is by giving farmers a high degree of control over the wildlife as well as allowing them to derive the potentially significant benefits that can be earned from wildlife management. Land use planning and changes in land use are key elements of community-based natural resource management programmes.

How can land use planning be used to help reduce human-wildlife conflict?
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. Part of the changes might also require the development of some of the other approaches outlined in this chapter for reducing human-wildlife conflict. Land use planning might achieve some or all of the following:

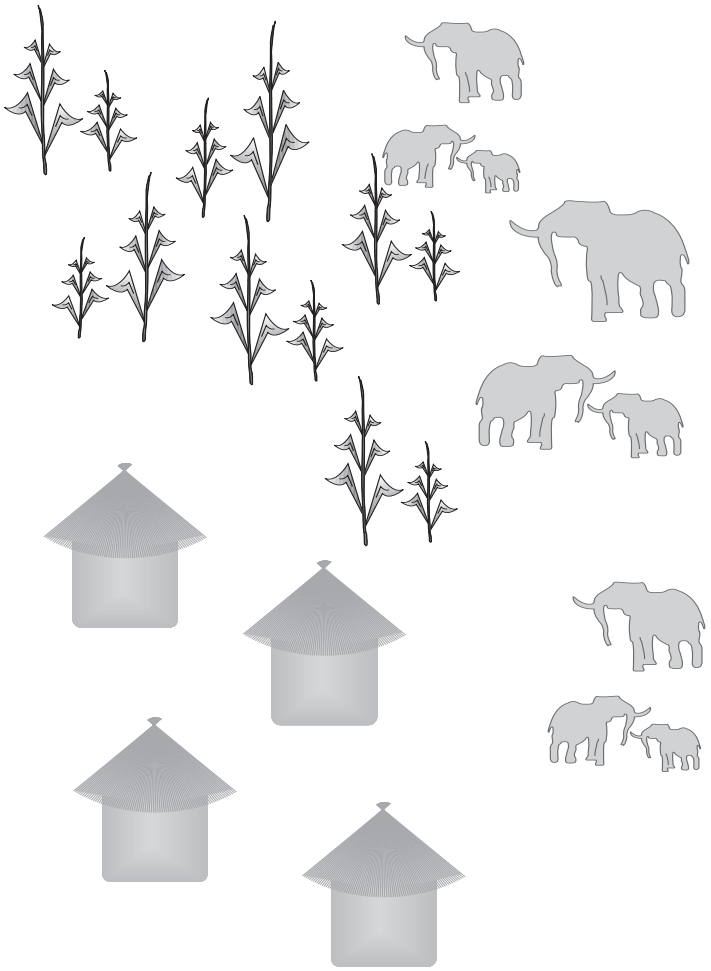
- Limiting the encroachment of human settlements in wildlife areas;
- Relocation of agricultural activities out of wildlife areas;
- Consolidation of human settlement patterns that are near wildlife areas;
- Creation of secure key areas of habitat, such as routes or corridors, that will permit wildlife 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.

How can land use change be used to reduce human-wildlife conflict?
Changing farmers views of wildlife is a challenging process. The argument is that if farmers derive direct and substantial benefits from wildlife they will be more willing to tolerate the costs of living with wildlife. Farmers' demands for problem animals to be killed and for compensation was driven by the government control of wildlife. CBNRM programmes seek to return the responsibility and the rewards to communal land farmers, turning wildlife from a liability into an asset. The level of financial benefits provided by CBNRM programmes are crucial in influencing farmers' decisions. Small amounts of revenue, over which they have little control, are unlikely to change their attitude to wildlife. On the other hand, programmes that help generate large financial incentives for farmers stand a much greater chance of success.

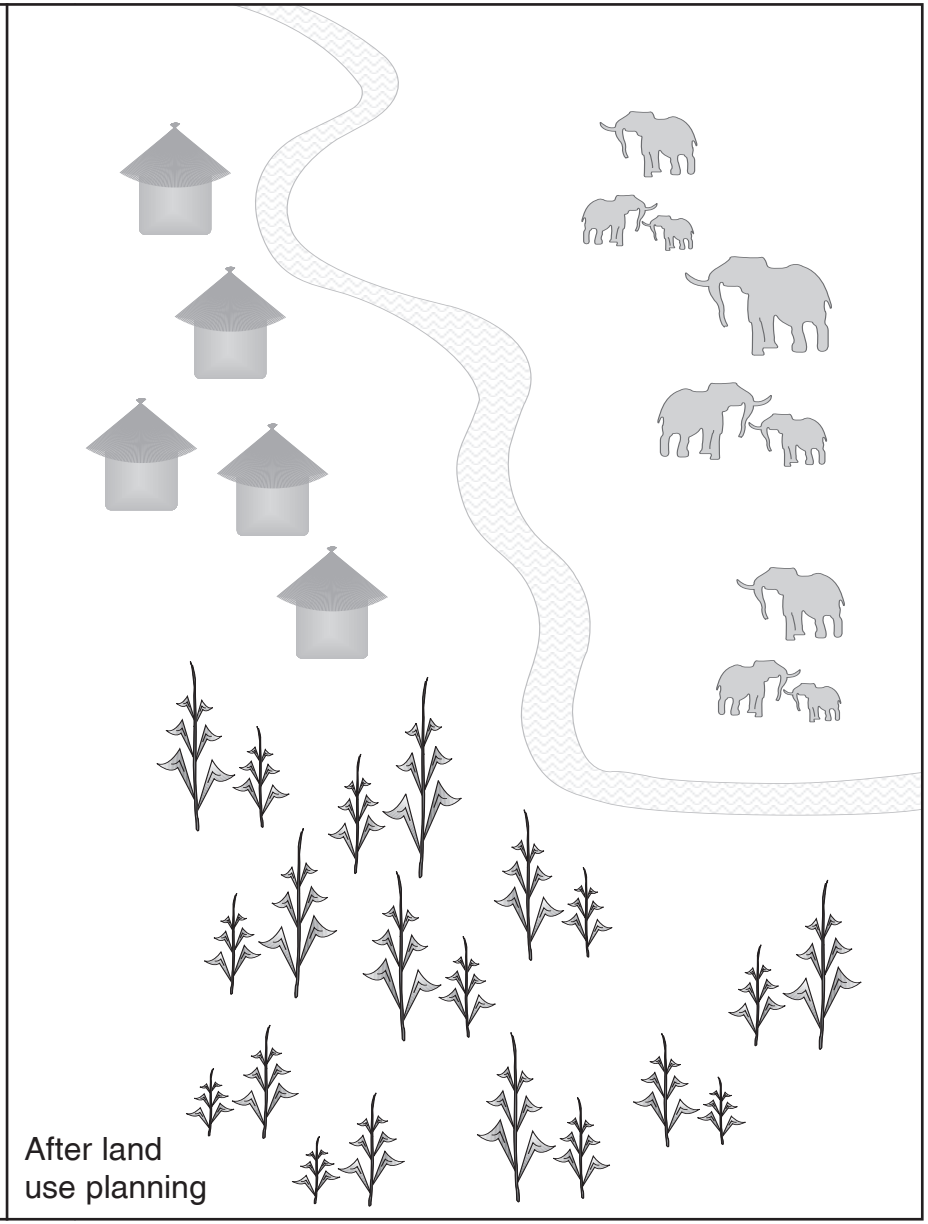
What lessons have been learned from land use change? There are a large number of lessons that have been learned from a wide variety of programmes from across Southern Africa. These cannot be fully reviewed in this manual. Some of the key lessons learned have been:

- **Financial:** The benefits of living with wildlife must significantly exceed the costs of living with wildlife. The problem is that the costs of living with wildlife are often not evenly distributed in a community of farmers.
- **Community-based organisations:** In the communal land context, wildlife and the benefits from it need to be managed at a community level. This requires representative, skilled and well-financed community-based organisations. Historically, people in the communal lands of Southern Africa have had the least educational opportunities. As a result, the skills needed are often not available.
- **Policy and legislation:** For nearly a century wildlife management has been the responsibility of government. Experience has shown that governments and government officials are rarely prepared to give communal land farmers high levels of control over wildlife and the benefits that are earned. This makes it very difficult for farmers to view wildlife as an asset.

Example of Land use change



Before land use planning



After land use planning

Method	Description	Lessons Learned	
Dealing with animals directly		**Advantages**	**Disadvantages**
Dispersal (scaring)	Chasing "problem" animals away from the area of conflict through the use of firearms or small explosive devices such as thunder flashes. Most often used against large herbivores.	A commonly used approach.	Has limited success. Most animals are likely to move away temporarily only, soon learning that the activity constitutes no real threat. This is called habituation, the animal becomes used to and will resist the threat and will resume its normal activities within a relatively short space of time.
Lethal (destroying)	The killing of individual "problem animals".	Can be an effective solution in the short term. Local residents can have access to meat. Is an opportunity for the community to make money by offering the kill to a professional hunter. This method is only warranted when the "problem animal" has injured or killed a person.	This can be extremely risky and should best be left to those with experience in hunting dangerous animals. 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. Furthermore, any action needs to be taken quickly and those affected must be confident they can identify the animal responsible. There is some evidence that killing a predator only opens the territory for others to come in.
Relocation	The trapping and moving of individual animals to new areas.	Removes the problem without killing the animal. Very specific animal(s) targeted	Very expensive. The success of such an operation is dependent on the availability of skilled personnel to capture and transport the animal concerned. It is sometimes difficult to find a new location for the animal. Very often animals return to their original territory if they are not moved sufficiently far away or become a problem at new site.
Barrier: Constructions, normally fences, that separate people from wildlife. The most common are:			
Strand wire fences	Made of steel wire and droppers strung between metal poles, occasionally with a lower section of netting to keep out smaller animals.	Can be used by individual farmers	Their effectiveness depends on the design, construction and maintenance of the fence. Are generally ineffectual against large herbivores and carnivores. Require considerable upkeep.
Post fences	Solid barriers normally built with locally available timber.	Good at separating off small areas. Good for the construction of secure "bomas" or "kraals".	Very time consuming to build. Not suitable for the large scale separation of people and wildlife.

Method	Description	Lessons Learned	
		Advantages	Disadvantages
Electric fences	Similar in design to strained fences, consisting of two different sets of wires which are electrically charged. When an animal attempts to cross the fence it receives a powerful electric shock. The design of the fences must be such as to withstand the challenges posed by large mammals.	Are effective animal deterrents. Provide tangible proof of action against HWC to communities	Has limited success. Most animals are likely to move away temporarily only, soon learning that the activity constitutes no real threat. This is called habituation, the animal becomes used to and will resist the threat and will resume its normal activities within a relatively short space of time.
Other	Other options, such as trenches, rock piles and stonewalls can be used to protect water installations and other resources from large animals.	If well constructed these can be highly effective and maintenance costs are minimal.	Can be expensive and time consuming to construct.
Compensation schemes	Monetary payment for damage to crops, livestock and personal loss from human-wildlife conflict.	Results in payment for damages incurred.	Does not deal with the primary cause of the problem – the problem animal itself. Compensation schemes tend to be expensive to administer and can mean huge open-ended financial commitments for the provider of the compensation. They are also open to corruption and abuse.
Insurance schemes	Payment of insurance premiums by individuals or a community for insurance against damage to crops, loss of livestock or personal injury or death.	These have worked well in an agricultural context when, on commercial farms, farmers have insured against such things as hail damage to crops.	This method has not yet been fully tested for sufficient information to be available on its success.
Predator control	**Although, most human-wildlife conflict situations are caused by large herbivores, predators can present a genuine threat to livestock. The cost of loss of livestock can be considerable for the individual farmer. There are a variety of measures that can be taken to protect livestock from wildlife. These include:**		
Herder dogs	Dogs are used to accompany livestock on their daily grazing forays. The dogs must be introduced to the livestock as puppies and must grow up with the livestock.	Is a highly effective method.	Takes time to train dogs. It has not always been easy to convince farmers to adopt this option.
Bomas	Use of a protective enclosure for the night as a barrier between livestock and any predators. Dogs may be used to guard the boma. The boma can also be used to keep newly born and young livestock in during the day.	Highly effective small enclosures.	Not suitable for large areas as are expensive and time consuming to construct.
Land use change	See explanation in this chapter.		
Land use planning			

What resources are available to combat human-wildlife conflict and what are the constraints?
Dealing with human-wildlife conflict is a major challenge to facilitators of CBNRM programmes across southern Africa. There are several general problems that seem to face all the programmes, these include:

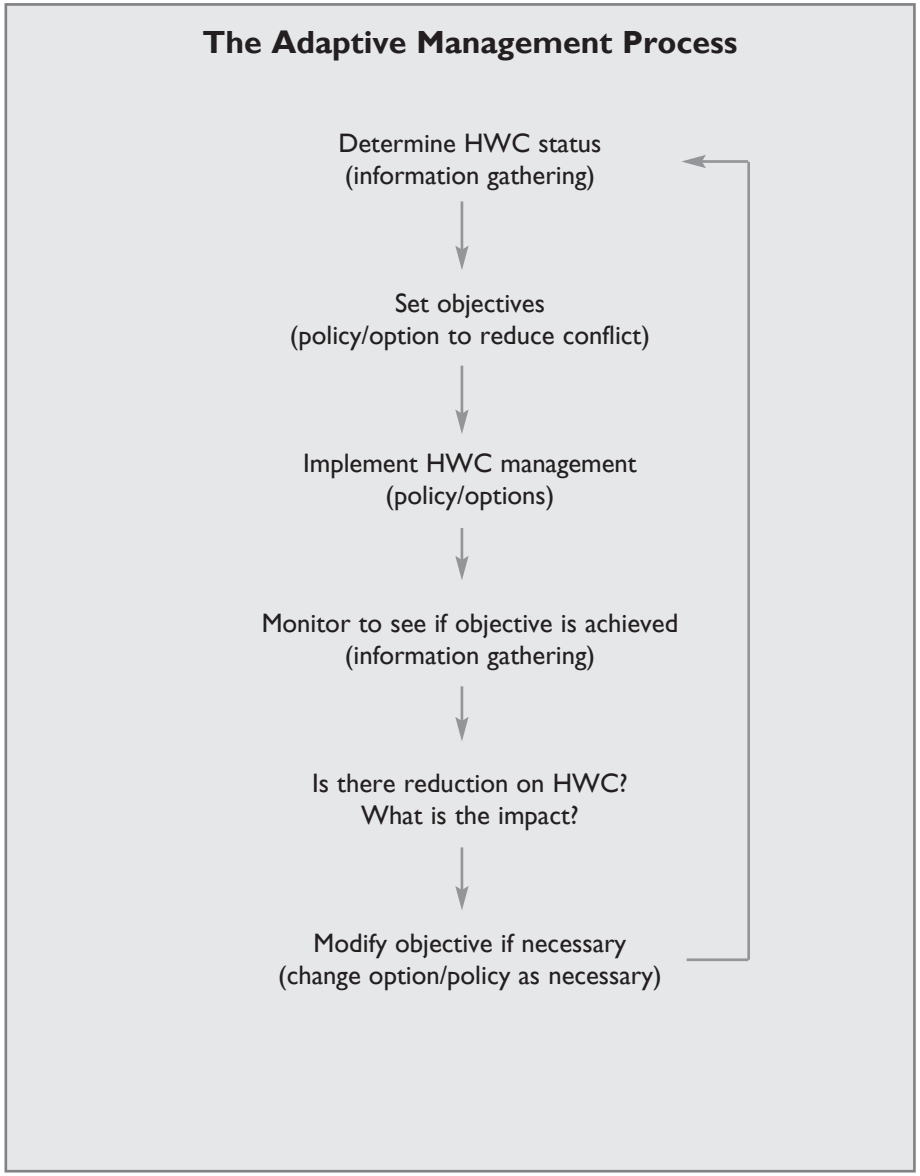
Resource	Constraints
Policy	Unclear; inadequate or non-existent
Money	Inadequate; unavailable; delayed payment
Staff	Insufficient number or insufficiently trained
Transport	Insufficient; unreliable
Terrain	Size; remoteness; inaccessibility
Field equipment	Insufficient; poor quality
Communications	Difficult; slow
Attitudes of people	Antagonistic; uncooperative
Information	Insufficient; inaccurate and exaggerated
Research facilities	Non-existent

What strategies can be adopted to help overcome resource constraints?
Such difficulties, large and overbearing as they may seem, are part of most wildlife conservation programmes. Constraints need to be recognised and dealt with in an integrated approach, often at a national level. Two strategies are important, these are:

- **Adaptive management:** Facilitators need to make test interventions with farmers with the approach that they will all learn from the outcome and be ready to implement changes as the situation and the results determine.

- **Pilot sites:** It may not be possible to address the problems of all farmers in a region or across the entire country. Facilitators must start with small, manageable pilot sites. Success can then be replicated and the pilot site used as a model of "best practice". Equally, failures should be documented and avoided in other areas.

The Adaptive Management Process



COUNTRY-SPECIFIC AND LOCAL LEVEL PROBLEM ANIMAL CONTROL OPTIONS

The previous chapter gave details of some of the most common methods currently employed for reducing human-wildlife conflict across the region. In this chapter we will look at some of the country-specific examples of these techniques as well as consider other techniques which have been used at a more local level.

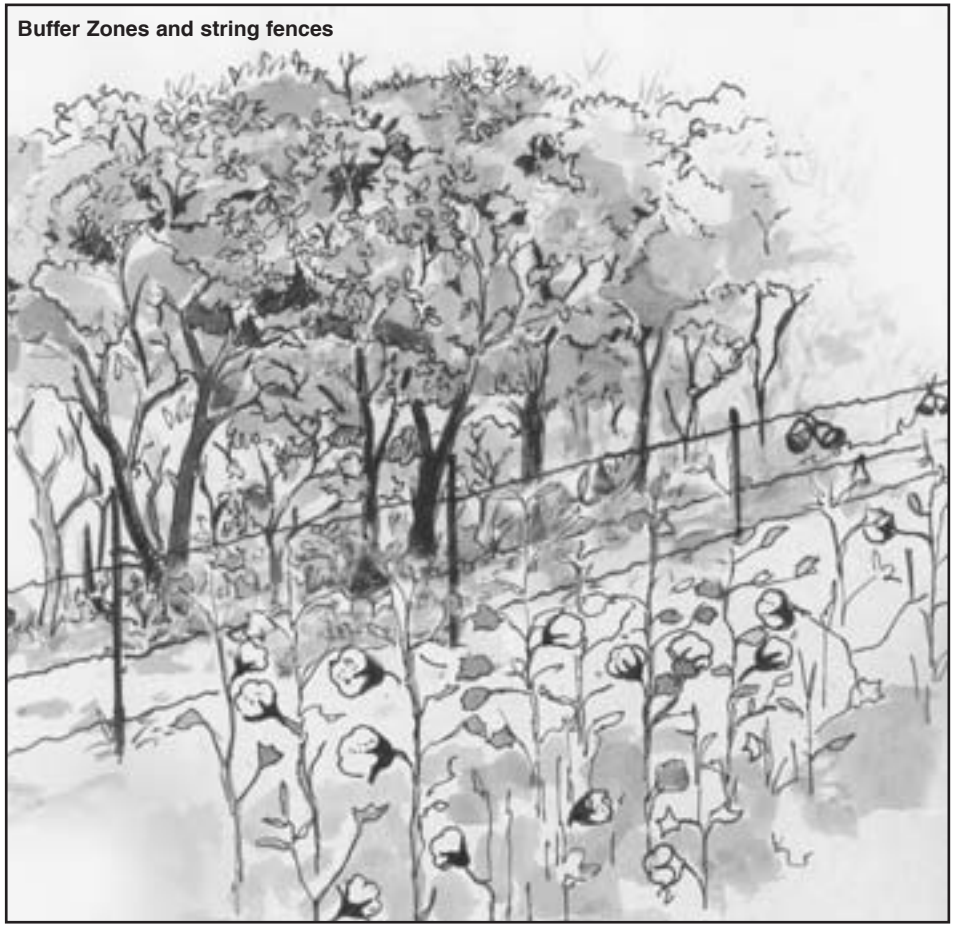
What examples are there of different approaches to human-wildlife conflict in the region?

A wide range of options to address human-wildlife conflict has been developed in the sub-region. Many have failed, and those that are successful are seldom transferable to other areas and different conditions. Successful human-wildlife conflict management strategies are generally very specific in addressing the particular circumstances and characteristic of the area and the nature of the problem. The main approaches can be grouped as follows:

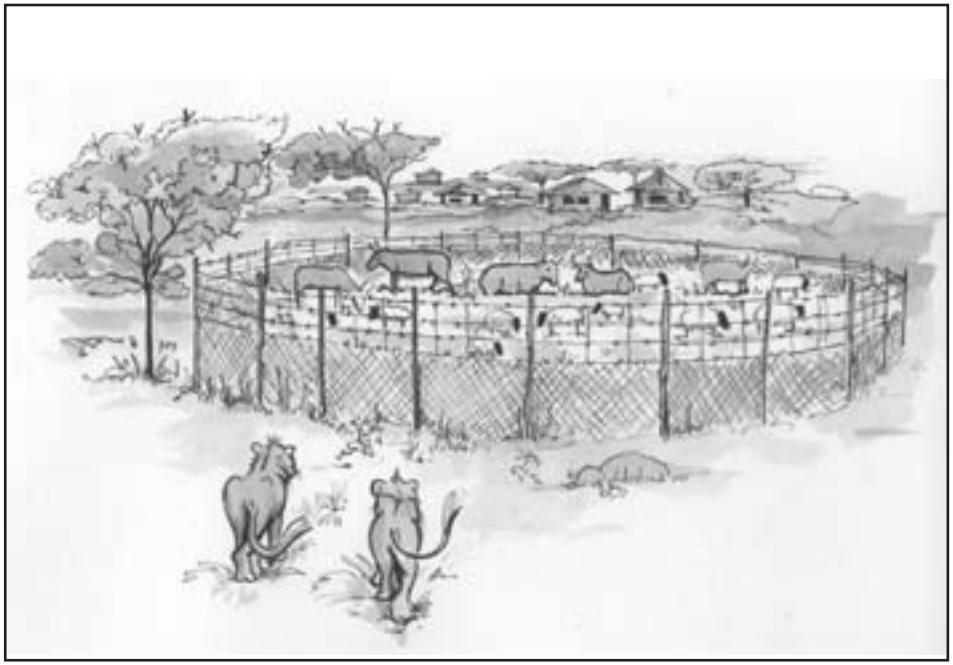
- **Vigilance method:** Aimed at alerting farmers to the presence of approaching wildlife. Examples include the use of watchtowers. Constructed at half-kilometre intervals these can be used to spot approaching wildlife and raise the alarm to their presence. There needs to be co-operation between farmers to manage the watchtowers and set up duty rosters, used widely in Zimbabwe, Mozambique and Zambia.

Watchtower

- **Preventative methods – Passive:** Aimed at impeding the passage of potential problem animals using simple physical barriers and deterrents:
  - **Buffer zones:** The clearing of a section of woodland along the boundary of a field (about five metres). This allows the farmer to spot approaching animals and it may act as a deterrent to approaching wildlife. Only slashers and axes are required to make the clearing.

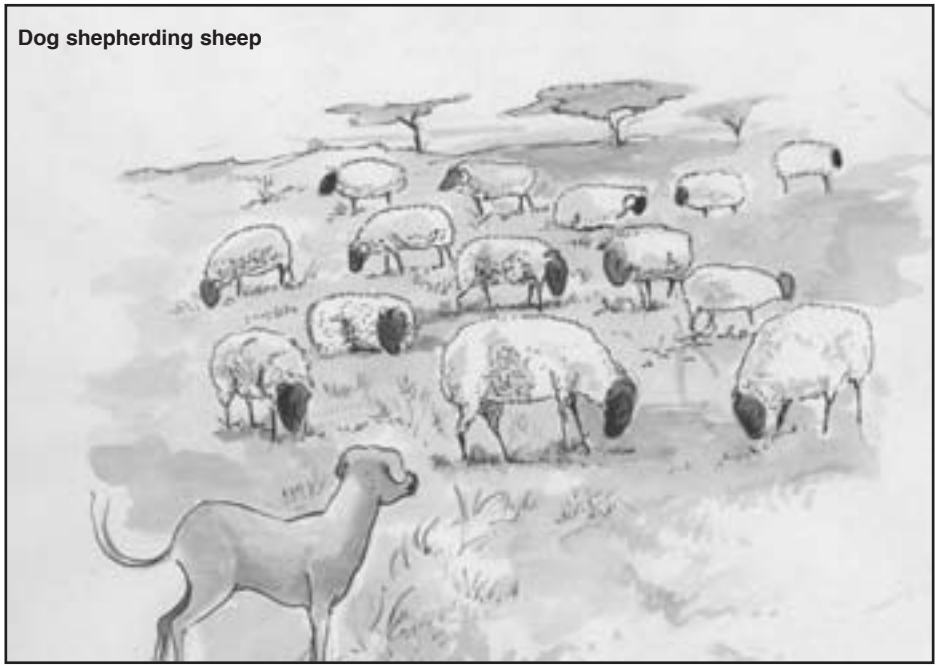

Buffer Zones and string fences

- **String fences:** These can be constructed along the edge of a buffer zone using local materials of 3-metre long poles placed at 30 metre intervals with bailing twine (or locally made sisal rope) strung between them and squares of mutton cloth attached to the twine at 5 metre intervals. This is used in conjunction with grease and hot pepper oil, which, when applied to the twine acts as a waterproofing media and causes irritation to any animal (elephants) making contact with the fence. Cowbells can be tied to the fence to serve as an alarm to alert farmers to the presence of animals. In use in Zimbabwe and Mozambique and being tested in Zambia.
- **Carnivore proof fencing:** Fences that would deter or keep out large carnivores and allow livestock to graze freely, can be erected. This is a technique used extensively in Namibia and some parts of Botswana, to assist farmers in controlling predation on their livestock by lions, spotted hyaena, wild dog and cheetah. Some farmers in northern Namibia have erected smaller fenced camps (2-10 hectares) near their settlements, where they keep some animals, like cows with small calves. This has been a very successful option that has reduced predation on calves during the vulnerable stage of their growth.



- **Preventative methods – Active:** Examples of active preventative methods used successfully in the region include:
  - **Herders, dogs and donkeys:** The use of dogs and donkeys to accompany livestock has recently been used in both Namibia and Botswana. This has enjoyed a reasonable degree of success in reducing incidences of human-wildlife conflict where cheetah and spotted hyaena are concerned. A wide range of dog breeds can be used for this, but under a specific "guard dog" programme in Namibia, Anatolian sheep dogs were used. Dogs are known to actively protect livestock against predators, whereas donkeys act more as a deterrent.

Dog shepherding sheep



- **Livestock herd management:** Farmers can actively manage their livestock herds to protect them against predation by controlling the breeding times. By managing the movement of the bull, the farmer can plan and synchronise when cows give birth. This will aid protecting the cows and their calves against carnivores during the most vulnerable days/months for predation and mean that protection of animals can be seasonally managed.

- **Active methods:** These are aimed at actively controlling human-wildlife conflict problems by killing, removing or scaring-off problem animals using various forms of disturbance.

- **Killing problem animals:** Human-wildlife conflict can occasionally be so severe that the only remaining option is to find and kill the "problem animal". In some countries, however, it is illegal to kill these animals and wildlife authorities generally take action. These animals are dangerous and many farmers, in Botswana, Mozambique, Namibia and Zambia, for example, who decided to take matters into the their own hands, have been mauled and even killed by lions, leopards and crocodile. In Namibia's Kunene and Caprivi regions problem animals have recently been offered to trophy hunters. A substantial sum of the trophy fee is then paid to the community. Through the leadership structure (in this case the Conservancy Committee) the funds are then be distributed to those that have suffered the losses. In one area of the Kunene, lions killed approximately 8 cattle, 12 donkey and 16 goats over a three-year period, amounting to an estimated loss of N$10,150. During this period two male lions were shot by trophy hunters and the community earned N$25,000 from the fees paid by the hunter. The same system is used in Zimbabwe and Zambia.

- **Moving or relocating problem animals:** In Namibia 16 leopards and 22 lions were relocated, marked with radio collars and then followed, in a study to test the success of relocations. All the leopards, and many of the lions, returned to the area where they were captured. The time it took them to return was directly dependent on how far they were moved. Consequently, relocation is not considered to be an effective strategy that can be used for addressing human-wildlife conflict except in the most unusual circumstances. This option is, nonetheless, relevant when species are endangered and thus worthy of expensive methods to save them. In the Namibian experiment, when large carnivores were not habitual livestock killers, they did not continue killing livestock even after they had returned to the area.

- **Fires:** These can be kept burning throughout the night in areas where raiding animals are regular visitors. If firewood is difficult to obtain any material which smoulders can be used.

- **Pepper dung:** This is made from elephant dung mixed with ground chilli and compacted into brick mould and dried in the sun. 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. The smoke lasts for up to 3-4 hours.

Pepper spray

Pepper dung being burned

Noisemakers: These are used by farmers to chase elephants away from fields. Such devices include commercially bought firecrackers, locally made bangers or explosives made from gunpowder or fertiliser. Alternatively, a large bang can be created by placing a sealed metal container, filled with water, on a fire.

- **Pepper spray:** This method is used in areas where animals become habituated to other simpler methods and, though effective, it is costly. Plans are underway to have the pepper spray locally produced.
- **Positioning of crops and food security:** Farmers should be encouraged to grow crops which are not palatable to wildlife or known crop raiding animals, such as chillies, on the edge of the field and palatable food crops, such as the grains (maize, sorghum, etc,) in the middle of the field close to the watchtower or homestead. This deters the passage of the animal and gives the farmer sufficient notice of the approaching animal. The growing of chillies has been tried in Zimbabwe and has provided the farmers with a crop that is not palatable to wild animals, is a viable cash crop and can be used in the defence of their fields. This is a method which can be sustainable, as there are several benefits to the individual farmer, and it does not require much input. Organisations assisting communities with this method need to investigate possible marketing options. In terms of food security, shorter season maize varieties (open pollinated variety) can be developed and grown. These can be harvested earlier than other food crops and be less vulnerable to crop damage which tends to occur late in the growing season.

- **Sustainable utilisation of "problem" species:** Recent developments in CBNRM have seen the introduction of systems where local communities benefit from wildlife, and, in particular, from species responsible for human-wildlife conflict, through various forms of sustainable utilisation. In the Nyae Nyae Conservancy in Namibia, the sustainable use of leopards, through eco-tourism, was evaluated as an option to balance the cost of living with them. It was calculated that the San community's losses due to leopards, are, on average, N$1.93 per adult per year. This is not an insignificant amount for a low cash-flow society.

  However, a programme was developed whereby the San community linked up with eco-tourism ventures to offer specialised "leopard tours". Using their traditional skill of tracking, they led tourist on a four-day expedition following the tracks of leopards, reconstructing the movements and behaviour of these secretive animals and setting up hides at the sites of fresh leopard kills. This gave tourists the opportunity to view leopard at close quarters. These expeditions were tremendously successful, generating as much as N$653.97 per adult, per year an amount which far exceeded the losses incurred from leopard predation on livestock. In Zimbabwe crocodile eggs were collected from the wild by communities, through the RDCs and sold to private crocodile farms. By providing a financial incentive to communities, this increases tolerance of crocodiles in the wild.

- **Other methods:** Experiments have been carried out in Kenya on the use of bees in problem animal control. Beehives are placed on the edge of the fields and the bees are conditioned to react to approaching animals. This can be used not only for the big herbivores but even for smaller problem animals.
- **Traditional methods:** Some experimentation was done in the Eastern Highlands of Zimbabwe to deal with baboons, using a method developed by a traditional healer. This involved 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 the baboons retreated. This method has not yet been scientifically proven.

TAKING ACTION AND EVALUATING ITS EFFECTIVENESS

How can the effectiveness of managing human-wildlife conflict be measured? The success of any management action needs to be monitored and evaluated. There has to be a way of measuring progress towards the objectives, even if circumstances and the participants in the plan change over time.

With a problem like human-wildlife conflict, once we have an idea of what the problem actually is (Chapter 2) we look for ways to intervene and manage the situation (Chapter 3). The success of management actions to reduce human-wildlife conflict
can be measured by simply comparing a "before and after" scenario. The following is a suggestion of a way to measure "before and after" progress in mitigating human-wildlife conflict:

In some areas there may not be available data on the "before" situation. The sooner detailed information, such as that indicated in the table below, is collected, the better. Regular monitoring will produce results where the success of managing human-wildlife conflict can be measured. An excellent example of such a monitoring system is the "Event Book" approach. This is presently being introduced in Botswana and Zambia, but has already been successfully used and gained wide acceptance in Namibia and Mozambique. The system was developed by WWF, Namibia Nature Foundation, and the Ministry of Environment and Tourism. Essentially, the community decides what they want to monitor. The technicians from the above mentioned organisation develop the monitoring structure accordingly and the entire process, including analysis, happens locally. The approach concentrates on measuring effort and is based on the use of icons and visual displays, that allow illiterate people to participate.

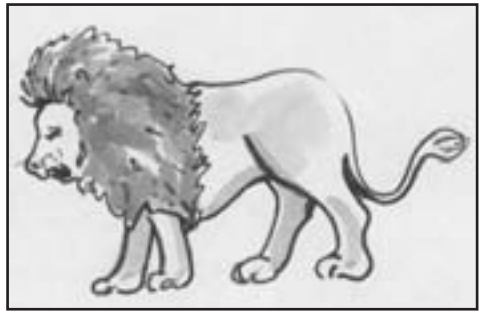
Two examples of recording human-wildlife conflict using the "Event Book" are presented below. For each incident of human-wildlife conflict that occurred one cell is marked. This simple approach soon displays valuable information, such as the seasonal pattern of lion and leopard problems.

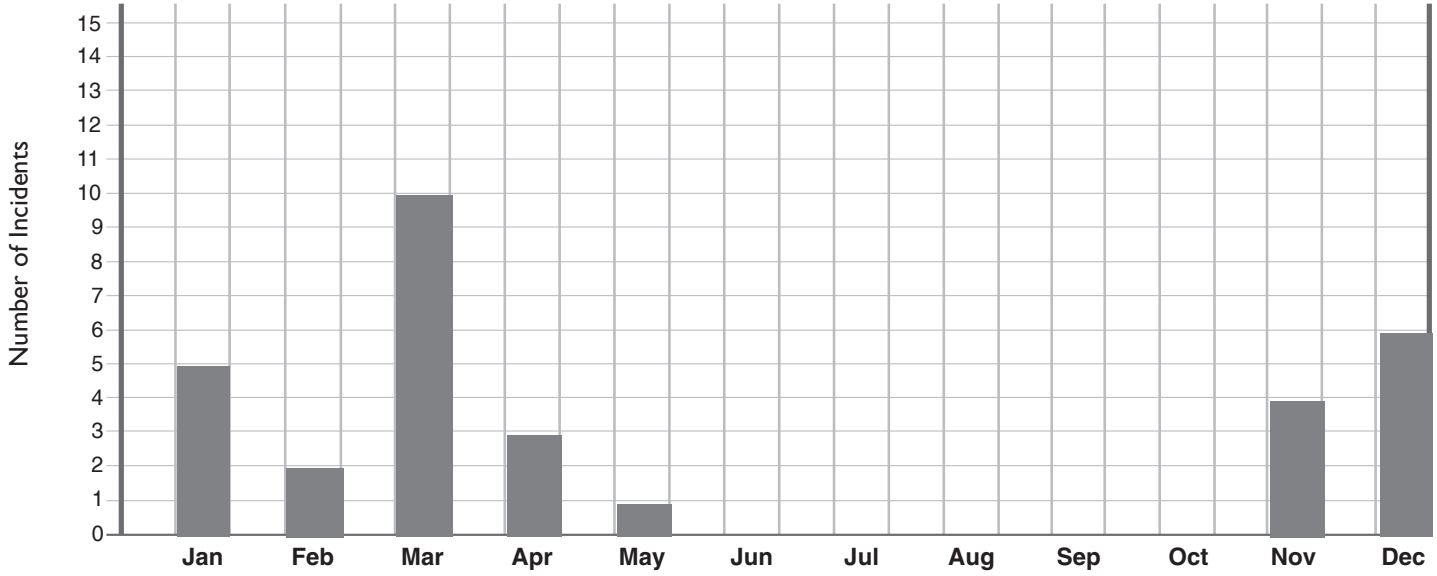
Predator Monitoring

Conservancy: **Caprivi**

Year: **2002**

Lion



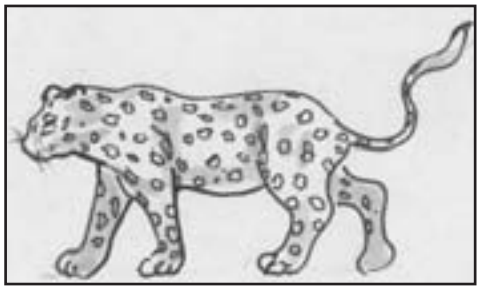


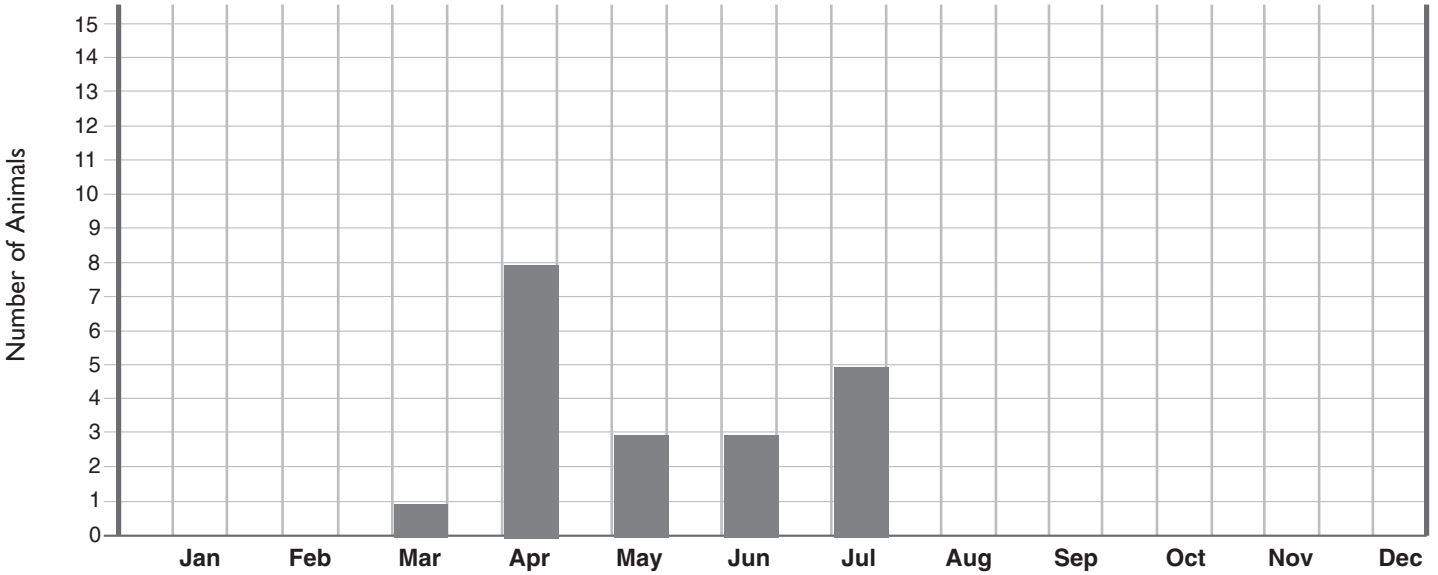
Predator Monitoring

Conservancy: **Caprivi**

Year: **2002**

Leopard



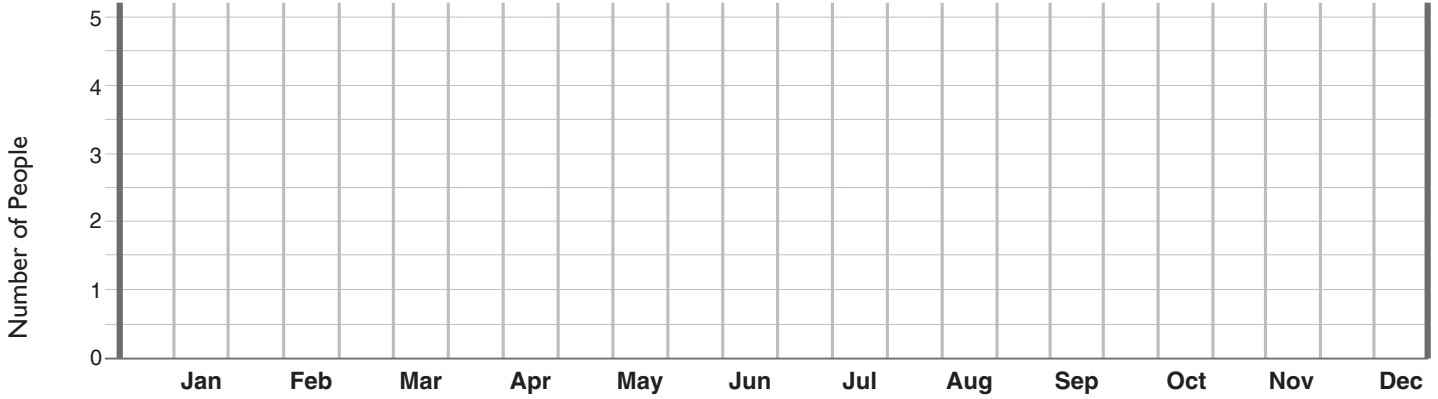


Problem Animal Attacks

Conservancy: **Caprivi**

Year: **2002**

Humans Attacked

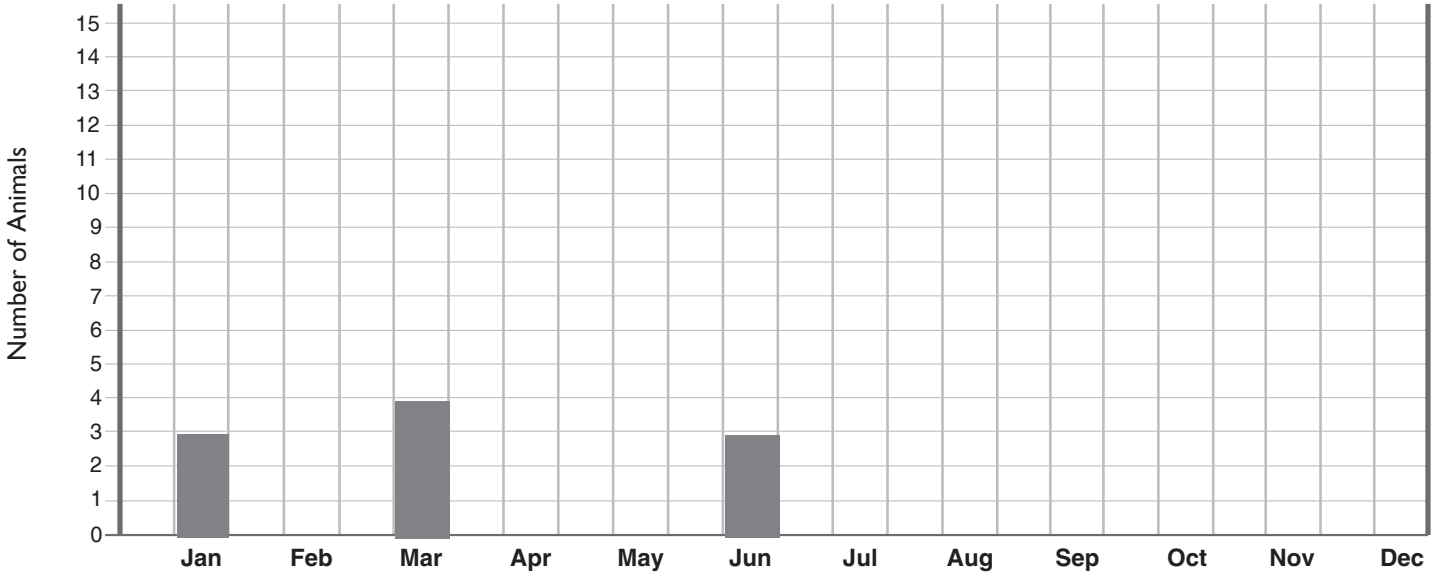


Problem Animal Damage

Conservancy: **Caprivi**

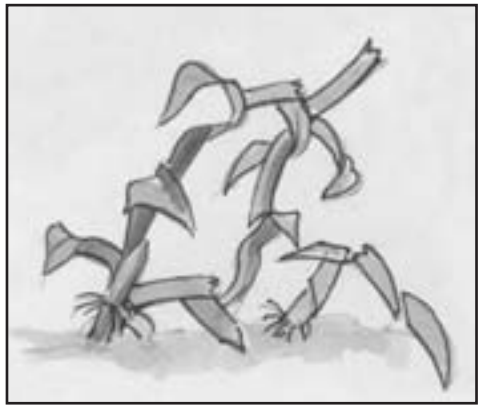
Year: **2002**

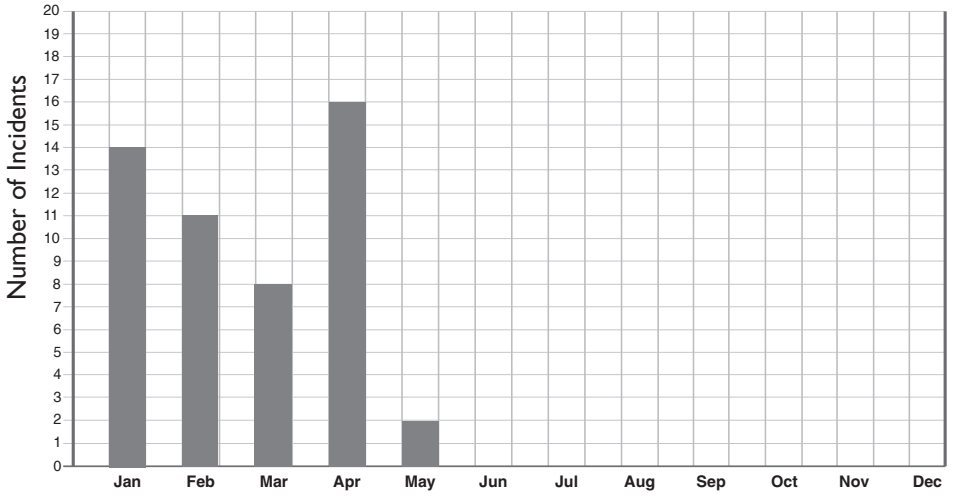
Livestock Attacked



Year: **2002**

Crops Damaged





The "Event Book" system has several valuable monitoring and reporting elements that cannot be fully addressed in this manual. It nevertheless has been highlighted as an example of a valuable tool that can be implemented in a wide range of conditions throughout the region. Any information gathered using the "Event Book" system should feed into a national reporting system for the compilation of national statistics.

APPENDIX 1: GLOSSARY OF TERMS

Bias	A personal opinion, usually irrational and not factually based
Boma	An enclosure or physical structure used for the protection of livestock against large carnivores
Browser	Animals that eat leaves, twigs and other plant matter
Carnivore	Animals that feed on other animals. Large carnivores weigh more than 15 kgs and include lion, leopard, cheetah, spotted hyaena, brown hyaena, striped hyaena and wild dog
CBNRM	Community-based Natural Resource Management
Dispersal	Moving animals to a new area
Facilitator	Individuals or an organisation responsible for the collection, storage, analysis and feedback on information relating to human-wildlife conflict
Grazer	Animals that eat grass
Habitual	Done or experienced regularly or repeatedly
Herbivore	Animals that feed on plants
Herding dog	A domestic dog that is brought up with livestock, protecting them against predators
Managing human-wildlife conflict	Preventing, limiting and controlling conflict between people and wildlife
Population	A group of individuals of the same species living in an area
Problem animal	An individual animal that habitually targets and damages the property of people in spite of the employment of protection or preventative methods by people
Rodents	Small-sized mammals with large curved front teeth. These include rats, mice and squirrels
Spatial	In relation to space or location
Stakeholder	A person, group or organisation having an interest in matters relating to human-wildlife conflict
Sustainable	Able to support, uphold, continue normally
Temporal	In relation to time
Wildlife	All free-ranging animals, with the exclusion of domestic animals
Wildlife authority	The government department responsible for wildlife and the environment

CONTACT DETAILS OF RELEVANT ORGANISATIONS

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GABORONE

African Wildlife Foundation
Private Bag K 88
KASANE

Mozambique

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Parque dos Heroies Mocambicanos
CP 1406
MAPUTO

National Director for Conservation Areas
Ministry of Tourism
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CP 4101
MAPUTO

SGDRN
Rua de Kassuende No. 296
MAPUTO

Zambia

Zambia Wildlife Authority
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CHILANGA

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Mid-Zambezi Elephant Project
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Chisipite
HARARE

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Cheetah Conservation Fund
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OTJIWARONGO

Predator Conservation Trust
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WINDHOEK

Natural Resource Working Group
World Wildlife Fund
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