

Marker, L. (2005). Cheetah conservation in Namibia. *Animal Keeper's Forum* 7/8: 330-338.

Keywords: 1NA/Acinonyx jubatus/cheetah/conservation/human-wildlife conflict

Abstract: Protected areas provide important refuges for numerous species, but the successful conservation of many large carnivores depends on conserving them beyond the boundaries of such areas as well. The most critical component of successful conservation outside protected areas involves working with local communities to achieve sustainable human-wildlife coexistence, particularly when the species under consideration are large carnivores. Conservation initiatives on private land must combine a myriad of interrelated, community-based approaches, including habitat and prey-base conservation or restoration, education about predators, conflict resolution, and financial incentives. Educating local people about predators is critical to conservation, as there is often a lack of awareness that locally abundant species may be globally threatened, and local concerns must be recognised and addressed for any significant progress to be made.

Cheetah Conservation in Namibia

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In Namibia, cheetahs have long been persecuted due to conflict with local farmers, and the population has suffered high levels of “off take” as a result, with 6,829 wild cheetahs reported killed or placed in captivity during the 1980s alone (CITES, 1992; Marker-Kraus *et al.*, 1996). Understanding the human/predator conflict problems within the South African system is rather complex, however, identifying and implementing effective conflict resolution strategies are key elements to the cheetah’s future in this country. The need to conserve the cheetah does not come into the mind of most southern African farmers who have lost livestock or game through cheetah predation. The farmer’s interests are in economic gain, be it through the sale of livestock, or selling game as trophies to foreign hunters. The key question to answer here is can the economic needs of the people be provided for, while at the same time the biological and ecological requirements of the cheetah be met?

Therefore, opportunities for southern African farmers to benefit from the land without compromising the survival of the cheetah must be developed. For successful conservation, cheetahs require large areas of intact habitat encompassing suitable and available prey, and there must be mechanisms that allow movement of cheetahs between regions to encourage gene flow. Land available for cheetahs in South Africa has become fragmented by the extensive development of game-fenced farms, where most of the game is “used” for trophy hunting and the presence of a predator, like the cheetah is not tolerated. Outside of the game-fenced farms are cattle farms and therefore the cheetahs are in conflict with the farmers and their livestock.

Research from my recent PhD. thesis has shown that cheetahs and farmers can co-exist if suitable strategies are employed. The objectives of cheetah conservation must be to encourage practices that tolerate predators through restored habitat and healthy management of wild game populations, via a reduction in both game fencing and the stocking of non-native game species, as well as through the establishment of conservancies.

Strategies for cheetah survival on southern African farmlands must include two important aspects, education and economic development. A multi-disciplined and integrated approach to educate the human population and alleviate poverty is necessary and this may be done through training and creating entrepreneurship opportunities. This does not mean financially paying farmers for cheetahs to remove them from their lands.

Protecting livestock and farmed game from depredation was the primary reason for cheetah removals reported to CCF, accounting for 91.2% of live cheetah captures (n = 343) and 47.6% (n = 30) of cheetah killings between 1991 and 1999 (Marker *et al.*, 2003a). Cheetah removals were often performed as a preventative measure, rather than in response to actual depredation events, with 59% of farmers removing cheetahs even though they did not consider them problematic (Marker *et al.*, 2003c). Analysis of scat from wild cheetahs on the farmlands indicated that they preferentially selected native game species over either livestock or exotic game (Marker *et al.*, 2003d), suggesting that they were less of an economic threat to farmers than was commonly perceived. However, such research is unlikely to change deeply ingrained perceptions, and it is important to work with local communities to reduce the level of economic losses that are sustained, which are commonly attributed to depredation events by carnivores.

A baseline survey to determine local attitudes towards large carnivores revealed that 64% of Namibian farmers surveyed removed cheetahs from their land, usually to prevent depredation, and more than 60% used no form of livestock management (Marker *et al.*, 2003c). Failure to use these basic

techniques, such as calving camps to protect vulnerable animals, synchronising calving seasons, using herders and/or guarding animals, bringing in all smallstock at night, and keeping adequate records of the stock, is likely to result in livestock losses that are usually blamed on predators, although other factors such as theft, stillbirths and accidental deaths are likely to play significant roles (Rabinowitz, 1986; Quigley and Crawshaw, 1992; Schumann, 2003)

Encouraging farmers to utilize more effective livestock management techniques can have significant impacts in terms of reducing losses: in Namibia, 76% of farmers who received an Anatolian Shepherd livestock guarding dog reported large declines in the level of livestock loss suffered (Marker *et al.*, submitted-a). We found that using guarding animals was very successful, as the dogs effectively guarded smallstock herds against both predators and theft, and also alerted herders to stock that had been left in the bush. Livestock guarding dogs were placed primarily with smallstock, while female donkeys with foals, kept amongst cattle, were found to effectively guard the herd of cattle from predators (Marker-Kraus *et al.*, 1996; Schumann, 2002). Reducing levels of livestock loss in this way lessens the economic pressures on farmers, and reduce the incentives for removing predators from private land (Marker-Kraus *et al.*, 1996; Schumann, 2003).

Predation upon livestock is often aberrant behavior for carnivores (Rabinowitz, 1986) and the majority of cheetahs that were found killing livestock during our study had physical problems that were likely to hamper their hunting efficiency (Marker *et al.*, 2003b). However, predation upon game is a more difficult issue, as it involves normal hunting behavior, and conserving large carnivores involves maintaining a suitable prey-base that they can exploit without creating intense conflict. Farmers should be encouraged not to stock exotic game species, as they are expensive, ill-adapted to cope with local conditions and suffer heavily from depredation (Marker and Schumann, 1998). The commercial farmlands in Namibia support good populations of free-ranging, native ungulates, and through the formation of conservancies, where multiple farms are managed co-operatively on a sustainable basis, the entire conservancy can sustain populations of large carnivores, as the resultant depredation does not severely affect individual farmers but is absorbed across the conservancy as a whole.



Anatolian Shepherd Guard Dog
(Photo courtesy of CCF)

Our data in Namibia showed that the perceived threat to livestock or game from cheetahs was much greater than the actual threat they posed. From our limited research in South Africa, this appears to be similar. Furthermore, there was no relationship between the percentages of livestock owned, livestock losses and cheetah problems and removals. The data suggested that there might be some ‘threshold’ level of loss, e.g. 15 or 20 animals per year to any cause, above which the farmer finds the situation unacceptable, regardless of the size of his herd overall, or reason for the loss. Changing the perception that cheetahs are a significant threat to livestock and game is clearly of vital importance if indiscriminate removal is to be reduced. An indication that the levels of tolerance towards cheetahs can be increased through awareness-building and education was shown by the increased proportion of tagged and radio-collared cheetahs Namibian farmers allowed to be released during our research. Most of the releases were facilitated through long-term contact and work with farmers and indicate

that extension-training programs have positive effects and that continuing such programs, and expanding them, is beneficial.



Problem cheetah are sometimes trapped and removed from farmlands where they present a threat to livestock. (*Photo courtesy of CCF*)

We believe that education in sustainable land use must be encouraged, with the primary goal of showing how the linkage of these practices provide direct and indirect benefits to communities. Programs should be developed that train land managers in the environmental value of appropriate range management and which optimizes the economic value of a sustainable, mixed wildlife-livestock system designed to avoid land degradation. Such programs should focus on the benefits of natural resource management, attaching economic and cultural values to these resources, and raising awareness of ecological issues. Successful examples of local conservancies and trans-boundary land management planning are providing a basis for developing large-scale land management plans for the future.

Education regarding predator ecology, behavior, population status, the role of large carnivores and more efficient game and livestock management techniques are all key components of any program aimed at resolving conflict with local people. Misconceptions abound in these areas, with uncertainty regarding species identification, ecology, behavior, how to determine the cause of stock losses, and the level of threat posed by wild carnivores. To address these issues in Namibia, a comprehensive education program has been one of the central tenets of CCF's operation since its inception, with the aim of making the research results available and relevant to the local communities. Over the past 13 years, Namibian education staff have worked with over 130, 000 students, encouraging an awareness of ecology and conservation issues, and have developed a wide range of educational materials for teachers to use in local schools. Many learners, from primary schoolchildren to university students, have also visited the field research centre, where they are taught about all aspects of cheetah biology, ecology and research projects being conducted, both locally and internationally.

Additional courses and training schemes, such as workshops on livestock management, environmental education, and ecology have been implemented with the aim of local capacity-building and empowerment, and internships are provided to assist students in developing marketable skills and completing degrees. Working with local people in a variety of ways, supporting local development, highlighting the potential value of predators on private land and furthering the understanding of

ecosystem management is key to changing negative attitudes towards wildlife, and ultimately reducing the level of conflict (Marker, 2003).

The availability of a wild prey base for the cheetah is critical in the issue of predator conflict in southern Africa. According to many Namibian farmers, maintaining a substantial population of wild game is the most important feature in reducing livestock predation. Therefore mixed farms with both livestock and wildlife should be encouraged. The relationship between prey availability, livestock predation and feeding behavior in cheetahs has important management implications. Our data indicated that cheetahs preferentially take wild game species over domestic livestock. Although domestic stock were evident in 6.4% of the scats, confirming that cheetahs do prey upon livestock, two-thirds of the available prey base on Namibian farmlands is livestock, suggesting that cheetahs appear to preferentially select game species. Farmers' reported information supports this finding.

One of the biggest arguments against allowing cheetahs on game farms is the risk of them preying upon expensive, exotic game animals. Many game farmer's stock exotic game species on their land for trophy hunters, and these animals are not only more valuable than indigenous game but may also be more liable to predation than the better-adapted indigenous species. Although results presented from scat analysis suggest that cheetahs prey mainly upon indigenous game species, even a relatively low level of predation upon expensive, introduced game can have economic impacts upon farmers that they are unwilling to tolerate. Therefore, strategies to mitigate such economic losses could include fencing sections of farms that contain expensive game animals. These initiatives should be a part of a game farm management plan and linked to permitting regulations as a part of government policy, as most game-fenced areas are not conservation areas but are private businesses. Proposed game laws in Namibia will stipulate that game-fenced areas cannot eliminate wildlife indiscriminately for private gain. Therefore, government policies can be important.

A longer-term, more sustainable strategy than fencing in small portions of land for game, might be the removal of game fencing and, instead, the development of cooperative game management areas in the form of conservancies. Conservancies consist of adjacent farms that are joined together in broad units where natural resources are cooperatively managed using ecosystem-sensitive management plans. A constitution outlines conservation and management strategies, including the sustainable utilization of natural resources in conjunction with agricultural aims. Conservancy constitutions may include utilization of game for trophy hunting, meat, ecotourism, etc., and provide guidelines to assist farmers in coordinating the management and utilisation of species on the farms.

For instance in Namibia, proposed wildlife laws will provide incentives to farmers cooperating in conservancies to encourage large unfenced areas that will promote movement of game species, especially during droughts. Objectives for conservancy development should also include the connectivity of conservancies throughout the country therefore providing corridors for movement of wildlife (game and cheetahs) to ensure gene flow. Strategies such as these, whereby the sustainable utilization of natural resources is encouraged, will be critical components of cheetah conservation outside protected areas.

To reduce the levels of conflict between people and cheetahs, there must be some economic advantages to maintaining cheetahs on private land. Potential economic benefits include, trophy hunting, incentives for predator-friendly meat, and ecotourism.

However, large carnivores are often elusive and hard to observe, particularly outside of protected areas, so the chances of tourists actually viewing predators directly may be limited in many places, including Namibia. Despite this, we have found that showing visitors even indirect signs of carnivore presence can be a significant attraction: in Namibia, the occurrence of 'playtrees' (specific trees used by cheetahs for scent-marking) on farms provides an ecotourism opportunity for visitors, as they often show signs of cheetahs, which increases the awareness both of the presence and ecology of this rare species. Encouraging such ecological awareness amongst tourists is an important

component of predator conservation, both in Namibia and in other countries such as Kenya, where the tourist pressure on cheetahs and other carnivores is very intense (Burney, 1980; Wykstra-Ross and Marker, 2001).



Cheetah in a “playtree” used for scent-marking. (Photo courtesy of CCF)

Tourism, however, can be a fickle industry, and even isolated incidents of unrest or violence in a country can have substantial impacts on the numbers of tourists willing to visit an area, which can be devastating for local communities reliant upon tourists for their income (Infield and Adams, 1999; Sillero-Zubiri and Laurenson, 2001). For long-term success, several methods of generating revenue from wildlife should be combined to provide communities with a stable income, for instance by offering opportunities for both ecotourism-based safaris and trophy hunting.

Trophy hunting can play an important role in the conservation of large carnivores outside protected areas, with the intention that by giving predators enough potential monetary value, people are deterred from removing them indiscriminately (Child, 1996; Sillero-Zubiri and Laurenson, 2001). Revenue from trophy hunting can be substantial for local people, as hunters tend to spend more time and money in an area than other tourists (Edwards and Allen, 1992; Sillero-Zubiri and Laurenson, 2001). Namibia currently has a CITES export quota for 150 cheetahs, although the numbers of cheetahs reportedly killed for trophies has never reached the quota limit (Marker and Schumann, 1998). Trophy hunting accounted for only 11% of the wild cheetah deaths reported to CCF (Marker *et al.*, 2003a), and at its current level seems unlikely to have any significant effect on population viability.

However, almost a third of the trophy-hunted cheetahs reported to us were females, and if the same ratio occurs nationwide, such removals could be of greater concern. While efforts have been made with certain species to teach hunters how to distinguish between the sexes, with the aim of targeting males (Smith, 1995), the similarity between the sexes, limited visibility in densely bushed habitat and the rarity of encountering a cheetah on a hunt make this approach unlikely to succeed on the Namibian farmlands. Moreover, the potential revenues from trophy hunting presently seem to have little effect in terms of reducing indiscriminate removals, which still dwarf the number of cheetahs

killed for trophies (Marker *et al.*, 2003a). This is due to several factors, including the difficulty of finding a cheetah out on the farmlands without resorting to unethical, 'canned' hunts, and the relatively low trophy fee currently charged for cheetahs, which in 2000 was only US \$2000 (M.E.T., 1999). Raising the trophy fee substantially would make investing in trophy hunting far more beneficial for the landowners involved. Ideally, trophy hunting permits should be awarded to an entire conservancy, rather than to individual farmers, creating incentives for conservation across a large area.

Marketplace pressures can also have strong impacts in terms of driving conservation and raising public awareness of issues, as was seen with the highly successful marketing of 'dolphin-friendly' tuna, and such initiatives can also be utilized for carnivore conservation. Despite the reduction in cheetah removals by Namibian farmers over the years and an increased tolerance towards them, this trend could easily be reversed if economic conditions worsened in Namibia, as farmers would be less likely to tolerate any losses due to carnivores (Marker, 2003). To avert this situation, economic incentives should be provided to farmers who practice ecologically-sound livestock management, such as avoiding lethal predator control, joining conservancies, limiting stocking rates and restoring habitat. With this aim, CCF is currently collaborating with the Namibian meat production company, MeatCo, to investigate the viability of selling beef at a premium from farmers who use 'predator-friendly' techniques, providing direct economic incentives for farmers, and raising international public awareness.

As tourism is increasingly important in southern Africa, another beneficial development is the new certification in South Africa of 'cheetah-friendly' guest farms, which do not remove predators from their land, and this too could provide tangible benefits to conserving carnivores on private land. These initiatives ensure that landowners benefit directly from tolerating predators, circumventing the common problem of conservation revenues failing to reach local people (Martin, 1986; Hackel, 1999).

As human land-use has the greatest impact on the distribution and abundance of cheetahs, monitoring several parameters, including population fragmentation, health, and habitat loss will be necessary so as to not miss important elements which may affect species survival. Although maintaining cheetahs in protected areas will provide long-term habitat stability and, as such, are critical areas for the cheetah, conflict resolution between people and cheetahs will be a significant determinant for cheetahs in the future on private lands. As such, management of 'problem' animals will continue and necessary strategies must be implemented. Such strategies may include placing individuals in captivity, translocating animals, or re-introduction; each provides opportunities for species conservation but should be conducted under international guidelines. Overall, through collaborative research and multi-disciplined approaches, both within protected areas and on private lands, it should be possible to maintain large intact ecosystems for the cheetah, which is the most critical aspect of future conservation, both for cheetahs and for other large carnivores.

Conclusions

Protected areas provide important refuges for numerous species, but the successful conservation of many large carnivores depends on conserving them beyond the boundaries of such areas as well. The most critical component of successful conservation outside protected areas involves working with local communities to achieve sustainable human-wildlife coexistence, particularly when the species under consideration are large carnivores (Phillips *et al.*, 1995; Weber and Rabinowitz, 1996; Sillero-Zubiri and Laurenson, 2001). Conservation initiatives on private land must combine a myriad of interrelated, community-based approaches, including habitat and prey-base conservation or restoration, education about predators, conflict resolution, and financial incentives. Educating local people about predators is critical to conservation, as there is often a lack of awareness that locally abundant species may be globally threatened, and local concerns must be recognised and addressed for any significant progress to be made (Sillero-Zubiri and Laurenson, 2001).



A cheetah is crated for relocation by CCF staff and volunteers. (Photo courtesy of CCF)

Employing this approach on the Namibian farmlands has proved successful in terms of reducing conflict and diminishing removals, with farmers showing increased tolerance of cheetahs, and annual removal rates falling significantly, from a mean of 19 cheetahs per farmer per year in 1991 to 2.1 by 1999 (Marker *et al.*, 2003c). Conflicts still occur on the farmlands, and removals still take place, but this example shows that attitudes towards predators can be positively influenced by long-term conservation efforts. Highlighting the value of such work on private land does not diminish the importance of protected areas, but rather emphasizes the potential of employing approaches that transcend such boundaries for the effective conservation of large carnivores. Overall, through collaborative research and multi-disciplined approaches, both within and outside protected areas, it should be possible to maintain large tracts of habitat where large carnivores can be not only be tolerated, but also provide tangible benefits to local people. Achieving this goal will be the most critical step in attaining the long-term conservation of viable predator populations, not for just cheetahs in Namibia, but for any population of large carnivores wherever they occur.

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Cheetah Fast Facts

- Fastest land mammal on Earth; over short distances it can reach a speed of over 60 mph. A sprinting cheetah can reach 45 mph within 2.5 seconds. Top speed—up to 64mph—can only be briefly sustained.
- As the cheetah runs, only one foot at a time touches the ground. There are two points, in its 20 to 25 foot stride when no feet touch the ground, as they are fully extended and then totally doubled up. Nearing full speed, the cheetah is running at about three strides per second. Cheetahs can accelerate to freeway speeds in just a few strides!