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Human Aspects of Cheetah Conservation: Lessons Learned from the Namibian Farmlands

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Over the past century, the world's cheetah population has undergone severe reduction in both numbers and range. This is due to factors such as habitat fragmentation resulting from human development, the depletion of their natural prey base as land becomes dominated by agriculture and the resultant conflict with humans for livestock and farmed game. Although long-term studies have provided useful information regarding the ecology and biology of the cheetah, the real conservation challenge lies in a better understanding of human behavior and attitudes toward the cheetah. Only by addressing human issues can cheetah conservation strategies be implemented across large areas of their range. This article examines and discusses novel approaches aimed at modifying human behavior in those areas most critical for future cheetah conservation. These approaches could also be valuable in other areas where human conflict is a significant threat to the persistence of large carnivores.

Keywords *cheetah, conflict resolution, conservation, human–wildlife conflict, Namibia*

Introduction

Historically, cheetahs (*Acinonyx jubatus*) had a range that covered at least 38 African countries, spanning the entire length of the continent. They were also found throughout the Middle East and across the Indian subcontinent (Hunter & Hamman, 2003). Over the past century, however, the cheetah has experienced severe population decline, with global population estimates falling from approximately 100,000 individuals in 1900 to less than 15,000 today (Marker, 1998). This reduction in cheetah numbers has been accompanied by a dramatic range contraction: once found in at least 44 countries worldwide, the cheetah is now

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only thought to persist in 29, and has been extirpated from 13 countries within the past 50 years alone (Marker, 1998).

Disturbing as these figures are, population estimates alone do not reflect the gravity of the cheetah's predicament, as across much of its remaining range cheetah populations are so small and fragmented that they are unlikely to persist in the longer term (Marker, 1998). Once abundant throughout Asia and India, the Asiatic cheetah subspecies (*A. j. venaticus*) is now critically endangered and restricted to an isolated remnant population in Iran, numbering less than 100 animals, while cheetahs are also critically endangered in north, central, and west Africa with similarly small and fragmented populations (Marker, 1998; Nowell & Jackson, 1996). The best chance for cheetah survival now lies in sub-Saharan Africa, with a relatively large, intact population remaining in East Africa, and the largest population, of around 3,000 cheetahs, enduring in Namibia, in southwestern Africa (Marker, 1998). Across the entirety of its range, however, effective conservation action is clearly needed to halt the decline in cheetah numbers, and ultimately reverse it, if a future for the cheetah is to be safeguarded beyond this century.

The reasons for the drastic decline in cheetah numbers are complex, and vary across the species' range, but the primary factors include habitat fragmentation, a declining natural prey base, and conflict with humans resulting in intense persecution (East, 1992; Marker, 2003a; Nowell & Jackson, 1996). Land-use has changed markedly across much of the cheetah's range over the past century, with relatively pristine areas becoming dominated by agriculture as human populations, and attendant pressures, vastly increase. This has led to habitat destruction and fragmentation, with cheetahs restricted to increasingly small pockets of suitable land within an inhospitable matrix of human settlements (Nowell & Jackson, 1996).

This article uses the results of a long-term Namibian research project, conducted by the Cheetah Conservation Fund (CCF), to examine the issues surrounding cheetah conservation in the 21st century, and discusses possible strategies for ensuring the species' continued persistence under today's challenging conditions.

Protected Areas and Cheetah Conservation

Protected areas provide vital refugia for many wildlife species, as they safeguard patches of habitat in the face of escalating human pressure, but there is an increasing need for conservation efforts in other areas as well. There are at least 140 major reserves and wildlife management areas in regions where cheetahs occur, encompassing approximately one million square kilometers of land (Hunter & Hamman, 2003). Given this, it would be reasonable to hypothesize that cheetah conservation goals could potentially be achieved by focusing efforts within these areas, rather than trying to maintain substantial carnivore populations on private

land. However, the nominal protection of land in theory may often not translate into real conservation action on the ground, while many national parks, although large, may not encompass suitable habitat for the most threatened species. Additionally, cheetahs have been found to range exceptionally widely, often covering in excess of 1,500 km^2 annually (Marker, 2003), and, as has been demonstrated with other large, wide-ranging species, areas large enough to contain such extensive movements entirely within reserve boundaries are unlikely to occur within the current protected area system (Woodroffe & Ginsberg, 1998). Moreover, even where reserves are able to hold a population of cheetahs, the lithe build and lack of aggression that characterizes the species mean that they fare badly in direct competition with other, more powerful large carnivores such as lions (*Panthera leo*), spotted hyaenas (*Crocuta crocuta*), and leopards (*Panthera pardus*) (Durant, 1998). Predation by lions and spotted hyaenas is a major cause of juvenile, and sometimes adult, mortality for cheetahs within protected areas (Hunter & Hamman, 2003; Laurenson, 1994), and cheetahs frequently lose kills that they have made to these kleptoparasites (Caro, 1994). Such competitors are often found at high densities within protected areas, making it less than optimal habitat for cheetahs (Durant, 1998).

These factors explain why across much of their remaining range, cheetahs are predominantly found outside reserve boundaries: for instance, in Namibia, around 90% of the country's cheetahs are thought to survive on commercial farmlands (Morsbach, 1987). Despite Namibia having an extensive protected-area network, encompassing around 21% of its land area (Marker, 2003a), the lack of competitors, the year-round availability of water, and the abundance of prey (the majority of Namibia's free-ranging ungulates are found on the commercial farms) mean that the commercial farmlands provide relatively favorable ecological conditions for cheetahs (Marker-Kraus, Kraus, Barnett, & Hurlbut, 1996). Efforts must therefore be focused intensely on land beyond existing protected areas if cheetah conservation strategies are to be most effective.

Conflict with Humans

Despite ecological suitability, this preference for unprotected areas brings its own suite of problems for the cheetah, and developing effective solutions to these problems will be key to successful long-term conservation. As has been seen in numerous regions of the world, from Minnesota to India, large carnivores occurring on private land are commonly met with hostility, fear, and, ultimately, persecution (Berg, 2001; Sillero-Zubiri & Laurenson, 2001; Woodroffe, 2000). The situation in Namibia is no different: during the 1980s alone, over 6,800 Namibian cheetahs were reported as removed from the wild (CITES, 1992), and this figure is likely to be a substantial underestimate of the true removal level.

Long-term research on the Namibian farmlands has revealed that killing by humans is the single main source of mortality for adult cheetahs, particularly

those of prime breeding age (Marker, Dickman, Jeo, Mills, & Macdonald, 2003a). Although cheetahs on farmland have reduced juvenile mortality compared to those in areas such as the Serengeti (Laurenson, 1994; Marker et al., 2003a), the species' rapid reproductive rate and large litter sizes mean that high adult mortality is likely to be far more damaging to long-term population viability than the loss of juveniles (Crooks, Sanjayan & Doak, 1998). Therefore, determining and alleviating the causes of such conflict will be imperative for successful cheetah conservation efforts outside protected areas.

Determining the Causes of Conflict

Developing an accurate understanding of the reasons for conflict between wildlife and humans is clearly fundamental to resolving it. A perceived threat to livestock or farmed game was cited as the reason for almost all the captures and nearly half the killings of wild cheetahs on Namibian farmland between 1991 and 1999 (Marker, Dickman, Mills, & Macdonald, 2003b). Cheetah removals appeared to be performed as a preventative measure to reduce the chances of depredation. For example, surveys of local landowners between 1991 and 1993 revealed high levels of removals even on farms where cheetahs were not considered problematic (Marker, Mills, & Macdonald, 2003c). Predator removal seemed to be employed as a substitute for other management strategies such as the use of guarding animals or the corralling of vulnerable stock, rather than being utilized as a last resort for the elimination of a specific animal causing repeated problems.

Despite the convictions of the farmers, little hard proof could be found to corroborate the belief that cheetahs posed a substantial threat, especially to livestock. Marker et al. (2003b) report there was only evidence for possible livestock depredation in six out of 198 incidences where cheetahs had been captured with the aim of reducing livestock losses on a farm. Similarly, scat analysis studies have revealed that cheetahs on the Namibian farmlands show prey selection toward local, native game rather than domestic stock or the exotic game species that game farmers are most keen to protect (Marker, Muntifering, Dickman, Mills, & Macdonald, 2003d).

The results of scientific studies, however, are unlikely to have much impact on changing the deeply ingrained beliefs of local farmers. Moreover, demonstrating that the level of stock loss is less than is commonly perceived, even by a wide margin, is not enough to enact the fundamental change in attitudes that is necessary if cheetahs are to be openly tolerated across wide swaths of private farmland. Employing various conflict resolution strategies, such as the use of herders, guarding dogs or donkeys, or more effective corral structure, have been shown to be highly effective in reducing losses (Marker, Dickman, & Macdonald, submitted; Ogada, Woodroffe, Oguge & Frank, 2003), but even this approach is unlikely to be sufficient for the farmers on whose land large carnivores persist. As the Namibian studies showed (Marker et al., 2003b), the level of predator removal is

often not well correlated to the degree of actual depredation, meaning that even if conflict resolution techniques reduce losses further, there may not be a matched decrease in removal rates. For farmers suffering from economic hardship, even small levels of loss can be devastating (Oli, Taylor, & Rogers, 1994), and even for richer landowners there would seem little reason to tolerate predators that are merely a financial burden.

A myriad of approaches, including extensive education programs, habitat restoration, and economic incentives for conservation, will be vital if future efforts for cheetah conservation are to be effective. Much cheetah research conducted to date has focused on the animal itself, and such studies have yielded a wealth of information regarding cheetah ecology, demography, social structure, genetics, and health (e.g., Caro, 1994; Kelly, 2001; Laurenson, 1995; Marker & Dickman, 2003; Marker et al., 2003a; Munson et al., 1999; O'Brien et al., 1985). Such data will prove very valuable in the future management of the species, but at present perhaps the most imperative concern for long-term conservation is to adequately address the human dimension of this complex situation. A multidisciplined and integrated approach to educate the population and alleviate poverty through economic development is necessary.

Addressing the Human Dimension

Land Management Issues

Increasing the level of conservation awareness and relevance among local people is one fundamental step toward achieving long-term sustainable management goals (Sillero-Zubiri & Laurenson, 2001). Developing better land stewardship practices, although often initiated with conservation in mind, can have beneficial effects that range far beyond the preservation of a focal species. In Namibia, for example, the commercial farmland habitat has been degraded through a desertification process known as bush encroachment, where factors such as livestock overgrazing, fire suppression, and the extirpation of mega-herbivores cause the excessive multiplication of certain endemic bush species (Bester, 1996). This has had severe repercussions in terms of reduced land productivity, increased economic costs for farmers, and changes in local biodiversity patterns, including the density and distribution of ungulates (Bester, 1996; Meik, Jeo, Mendelson, & Jenks, 2002; Muroua, Marker, Nghikembua, & Jeo, submitted). Although the last problem has the most obvious impact on cheetah populations, bush encroachment can also have a more insidious effect by increasing the financial hardships of farmers, and thereby reducing their tolerance for maintaining predators on their land (Marker, 2003).

In response to this, CCF has initiated a large-scale selective bush harvesting project, with the aim of turning detrimental bush into an economic asset by producing a clean burning wood fuel that can be marketed in Europe, Namibia, and

South Africa (Schumann & Marker, 2002). In addition to cheetah habitat restoration, the project aims to empower Namibians through capacity building, providing local employment, bringing in foreign revenue, and providing political leverage to implement sound conservation strategies.

Economic Incentives for Conservation

Direct economic incentives are often essential if local communities are to fully embrace conservation initiatives (Sillero-Zubiri & Laurenson, 2001). Ecotourism is one of the most commonly cited methods for demonstrating that conservation efforts can yield a financial benefit, and has been very successful on the Namibian farmlands, where visitors come to learn about the cheetah and other wildlife, and generate revenue by staying with local farming families. However, although valuable, tourism can be an extremely fickle industry, reliant on global confidence in travel, and isolated incidences of political unrest in a country can have devastating impacts (Sillero-Zubiri & Laurenson, 2001). Ideally, conservation incentives should be diversified to reduce dependence on any single strategy, and in Namibia CCF has been encouraging a variety of schemes, including the marketing of "predator-friendly beef," where farmers employing ecologically sound techniques are rewarded through a price premium for their products (Marker, 2003).

Trophy hunting, although controversial (McCarthy, 2003) also has the potential to be a useful conservation tool if conducted properly. Namibia has a CITES quota for the export of 150 cheetahs annually (CITES, 1992), and a suitably high trophy fee could make landowners more likely to tolerate the presence of cheetahs, as the financial gains resulting from a trophy hunt could make it economically viable to maintain cheetahs on their land. The fundamental tenet of all these economic incentives, however, is that local communities, on whose land the carnivores live, must be able to discern a tangible benefit and link that directly to conservation efforts if such schemes are to be successful in the longer term.

Education and Training

Education—locally, nationally, and internationally—is clearly critical for effective conservation (Marker, 2003). Local people may be unaware that a regionally abundant species is globally imperiled, and be uncertain as to what role they can play in its protection, whereas widespread support and financial backing are vital for addressing complex conservation issues. Programs should be developed that train land managers in the environmental value of appropriate range management, which optimizes the economic value of a sustainable, mixed wildlife-livestock system designed to avoid land degradation. Educating communities about conservation issues and empowering local people so that they can be instrumental in responsible decision-making have been key elements in CCF's

successful Namibian conservation program and are some of the most important aspects of any human and wildlife conflict resolution program.

Conclusion

Large carnivore conservation, especially outside protected areas, is difficult and complicated, but can be achieved through appropriate strategies. Results from Namibia suggest that through long-term research, the implementation of schemes aimed at economic improvement, and widespread education about ecology and conservation, it is possible for people to move toward a sustainable coexistence with predators on private land. These strategies may have applications that extend to other cheetah range countries and also to other species and situations where conflict with humans is a primary threat.

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