The Role of Behavioral Research in the Conservation of Chimpanzees and Gorillas

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Published online: 11 Aug 2010.

To cite this article: Elizabeth V. Lonsdorf (2007) The Role of Behavioral Research in the Conservation of Chimpanzees and Gorillas, Journal of Applied Animal Welfare Science, 10:1, 71-78, DOI: 10.1080/10888700701277691

To link to this article: http://dx.doi.org/10.1080/10888700701277691

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The Role of Behavioral Research in the Conservation of Chimpanzees and Gorillas

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Chimpanzees and gorillas are among man’s closest living relatives, sharing most of the human genetic code and having many similarities to humans in anatomy, physiology, and behavior. Like humans, these apes make and use tools and have strong family bonds. Chimpanzees even show population-specific behaviors similar to those of human cultures. However, chimpanzee and gorilla populations are in dramatic decline due to bushmeat hunting, habitat loss, and the varied risks of small, isolated populations. The first step in conserving the world’s ape populations in the wild is to recognize and understand the complexities of these threats. Mitigating the risks takes a deeper understanding of ape behavior. This article provides examples of how gorilla and chimpanzee behavioral studies intersect with, and are critical to, conservation efforts.

Chimpanzees and gorillas are among man’s closest living evolutionary relatives, sharing large percentages of our genetic code and having many morphological, physiological, and behavioral similarities to humans. Both gorillas and chimpanzees have the cognitive capacity to perform complex tasks such as making and using tools (Breuer, Ndoundou-Hockemba, & Fishlock, 2005; van Lawick-Goodall, 1964; Lonsdorf, Ross, & Melber, 2006) and navigating intricate social environments (Goodall, 1986; Watts, 1996). In addition, metapopulation analyses of chimpanzee behavioral repertoires have shown population-specific differences.
similar to those of human cultures (Whiten et al., 1999), and future research may show the same variability in gorilla behavior. However, populations of chimpanzees and gorillas across Africa are declining due to the combined threats of disease risk, habitat destruction, hunting, and ever smaller population sizes (Tutin, 2001). Due to the complexity of ape behavior and social systems, conservation initiatives for the remaining populations will succeed only if they consider behavioral variables critical to conservation planning.

Long-term and detailed behavioral studies on African apes began in the 1960s when Goodall began studying chimpanzees at Gombe National Park (then a reserve) and Fossey started working with mountain gorillas at Parc National des Volcans in Rwanda. Both researchers collected data on individually recognized apes and kept detailed histories of the behavioral, social, and reproductive lives of these nonhuman animals. Their studies and those that followed and built on their work have shown that some of the natural history characteristics shared by chimpanzees and gorillas make conservation of these species particularly challenging.

Both species have incredibly complex social dynamics within their breeding groups. Gorilla societies are polygamous, with a dominant silverback male and several breeding females constituting the core social structure (Robbins, 1999; Watts, 1996). Both males and females may disperse from their natal groups when they reach sexual maturity (Robbins, 1999; Watts, 1996). Chimpanzees live in “communities” (van Lawick-Goodall, 1968) or “unit-groups” (Nishida, 1968) ranging in size from 20 to 150 individuals. These communities are multimale and promiscuous, and they have a male dominance hierarchy in which males form the stable core of the community and defend a group home range (Goodall, 1986). Chimpanzee society is a “fission-fusion” society, as members of a community may join, or leave, traveling parties at any time (Goodall, 1986; Wrangham, 1979). Males remain in their natal groups, whereas females typically leave the group on reaching sexual maturity (Nishida et al., 2003; Pusey, 1980, 1990).

In addition to having complex societies, gorillas and chimpanzees are both relatively slow to reproduce in the wild. The average age of first reproduction in gorilla females is 10 years, with a single offspring typically born every 3 to 4 years (Czekala & Robbins, 2001). Chimpanzees have their first offspring at 13 years of age on average, with a 3- to 5-year interbirth interval (Goodall, 1986; Nishida et al., 2003).

Conservation is ultimately a numbers game; that is, without viable numbers of animals, the population will become extinct. In chimpanzees and gorillas, long life spans, slow reproductive rates, and behaviorally complex societies result in populations that are particularly vulnerable to declines and less likely to recover from them (Tutin, 2001). Following, I provide specific examples of how behavioral information has benefited our understanding of these conservation issues and how additional data could inform future efforts.
SOURCES OF THREAT

Disease Risk

Epidemic disease has reportedly affected many gorilla and chimpanzee study sites, and managers often suspect that such outbreaks result from close contact with humans (Goodall, 1983; Guerrera et al., 2003; Homsy, 1999; Walsh et al., 2003). Long-term behavioral data are key to understanding, quantifying, and reducing disease risk in populations in the wild. Lonsdorf, Travis, Pusey, and Goodall (2006) detail how such data contribute to improving the risk analysis process. A brief summary of that work follows.

Risk analysis is a blend of (a) identifying a hazard (risk), (b) assessing the probability of that particular risk occurring, (c) identifying the actions or policies needed to reduce the risk, and (d) communicating the risk and risk-management proposals. Applied to great ape study sites, this process will help evaluate risks such as disease transmission between apes and humans, as well as the risks of differing management options (drop toilets vs. compost toilets). Behavioral data collection methods used for apes (lengthy, detailed follows of individually identified animals) provide information on spatial ranging patterns and social interactions. This information, in turn, provides a solid foundation for the risk-assessment process. These data are critical for understanding the contact structure of the community and the health effects of individual differences in behavior. Long-term data collection allows analysis of the impacts of “risky” behavior—such as spending time near human settlements—on survival and reproduction. Only with such long-term and detailed behavioral data can we fully understand what factors are likely to affect population viability for chimpanzees and gorillas in the wild.

Habitat Destruction

Few data exist on the impact of logging and the resultant habitat fragmentation on chimpanzee and gorilla populations. However, the information we have suggests that results depend on the location, the species, and their species-specific behaviors (Hashimoto, 1995; Plumptre & Reynolds, 1994; Tutin & Fernandez, 1984). In a study in the Lope Reserve in Gabon, Tutin, White, and Mackanga-Missandzou (1997) found that gorillas and chimpanzees responded differently to habitat fragmentation. Chimpanzee densities were similar in fragmented forest patches and swaths of continuous forest. Because of the reluctance of gorilla groups to cross large unforested gaps, however, gorilla densities were much lower in fragmented than in continuous forest. This study shows how, even within the same reserve, the different behaviors of the two ape species result in different conservation implications for logging. To protect chimpanzee and gorilla habitat for the future, we will need detailed behavioral studies—specific to a given locale—on ranging patterns,
range size, foraging effort, and diet variability to determine the type, location, and size of the habitat we need to protect.

Complex social dynamics can compound the difficulties of habitat fragmentation and protection (Pusey, Pintea, Wilson, Kamenya, & Goodall, in press). Behavioral studies show that both gorillas and chimpanzees are territorial, but chimpanzees lie at the extreme end of the spectrum in that male chimpanzees—in some cases—will defend their territory to the death (Goodall, 1986; Wilson & Wrangham, 2003). Thus, as chimpanzee density increases (as forests become smaller), the probability for lethal territorial interactions may increase as well. Furthermore, only after many years of behavioral data collection have we come closer to a full understanding of female chimpanzee social dynamics. For example, analyses of long-term data have shown that rank relations are important predictors of female chimpanzee reproductive success (Pusey, Williams, & Goodall, 1997) and that resident females have high site fidelity to small, overlapping core areas (Williams, Pusey, Carlis, Farm, & Goodall, 2002), whereas immigrant and subordinate females initially have lower site fidelity and must inhabit more peripheral areas (Murray, 2006). Therefore, when planning new reserves or planning for protection of existing areas, we need accurate behavioral data on the dispersal and settlement patterns of chimpanzees and gorillas.

The Bushmeat Trade

An understanding of behavior also helps us more fully understand the effects of the bushmeat trade, one of the primary threats to African ape populations. Indigenous forest people have historically hunted apes for meat at sustainable levels that did not threaten the survival of ape populations. Now, however, the combined effects of expanding human populations and the perception of bushmeat as a delicacy by city dwellers, both in Africa and abroad, have resulted in catastrophic losses of ape populations (Ammann, 2001).

Long-term behavioral studies on wild ape populations have shown that the mother–offspring relationship is extremely important and that youngsters may not survive becoming orphans, even after they are weaned (Goodall, 1986). Therefore, if a hunter shoots an adult female for bushmeat, her offspring are likely to become casualties as well. In addition, we have yet to determine whether reintroduction of surviving orphans back into their native habitat is a viable conservation strategy (see following).

Detailed studies also show that the death of a particularly important individual can lead to great behavioral destabilization within a group, resulting in a reorganization of its social structure. For example, removal of a male silverback gorilla and subsequent succession to dominance by a new silverback may result in loss of the previous incumbent’s unweaned offspring from infanticide by the new male.
Rigorous and long-term behavioral studies are key to identifying such secondary impacts.

MITIGATING THREATS

Reintroduction

Reintroduction of captive-born or orphaned animals is an often-proposed option for restocking endangered species into their native habitat. For chimpanzees and gorillas, reintroduction is exceedingly difficult because of their behavioral and social complexity. For example, the behavioral studies detailed earlier show that the territorial nature of chimpanzees may make it risky to reintroduce animals into areas where wild chimpanzees reside. Behavioral competence is also a concern, because social learning from adult conspecifics may be necessary for the development of much species-typical behavior in apes (Custance, Whiten, & Fredman, 2002). Finally, if we release previously captive apes near human settlements, their familiarity with former caretakers may result in an attraction to nearby humans and an increase in human–wildlife conflict.

A small number of ape reintroductions to mainland forest have taken place with both chimpanzees and gorillas (Courage, Henderson, & Watkin, 2001; Goossens et al., 2005; King, Chamberlan, & Courage, 2005). The most successful was the reintroduction of orphaned chimpanzees into the forests of the Republic of Congo, with 26 of 36 released individuals surviving (Goossens et al., 2005). The group involved with this reintroduction outlined a strict decision-making process and methodology that relied heavily on knowledge from long-term field studies on chimpanzee behavior (Tutin et al., 2001). Future such projects should follow their lead, selecting appropriate individuals for release and instituting the rigorous postrelease monitoring of reintroduced individuals needed to allow tracking of their ranging patterns, activity budgets, and demographic and reproductive events. However, without debating the merits of reintroduction as a viable conservation practice, I am offering these examples simply to illustrate the importance of behavioral data for the planning, success, and safety of such projects.

Ecotourism

Perhaps because of our close, evolutionary relationship and the behavioral similarities between humans and apes, gorillas and chimpanzees fascinate people the world over, and people therefore wish to see them in the wild. As a result, apes may be more valuable to local communities for attracting ecotourism than they are in the bushmeat and companion animal trades (Butynski & Kalina, 1998; Wilkie & Carpenter, 1999). However, behavioral studies have raised welfare concerns
regarding the habituation of apes for ecotourism purposes. For example, Blom and colleagues (Blom, Cipolletta, Brunsting, & Prins, 2004) found that gorillas showed negative behavioral effects from the habituation process, including increased daily path length and reactions of aggression and fear during contacts. Whether or not ecotourism is a profitable, ethical, and/or feasible conservation strategy is outside the scope of this article. The important point for this discussion is that we need accurate behavioral data on what constitutes “normal” behavior, such as daily path length and rates of aggression or fear responses, to measure the impact of ecotourism on apes and to perform the appropriate cost/benefit decision analyses.

CONCLUSIONS

Because many ape populations are relatively small, they require proactive management to prevent them from becoming extinct. As I have detailed earlier, taking the complexity of gorilla and chimpanzee behavior into account should make management actions much more effective. For example, protecting islands of habitat for chimpanzees may not be successful if their natural territorial behavior renders that strategy ineffective. Likewise, because it may increase the risks of disease transmission, ecotourism may not be appropriate to provide income alternatives to bushmeat. Behavioral research is an important part of assessing conservation strategies for apes and should play a key role in the multidisciplinary approach needed to address the challenging and complex issues facing chimpanzees and gorillas today.

ACKNOWLEDGMENTS

A preliminary version of this article first appeared as a newsletter article in The Conservation Behaviorist, a publication of the Animal Behavior Society Conservation Committee (Lonsdorf, 2006). I thank S. R. Ross for helpful comments on this article and T. N. Melber for editorial assistance. I also thank the many hard-working field researchers and field assistants who have dedicated their lives to the study of chimpanzees and gorillas.

REFERENCES


