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The Implications and Perceptions of Human-Baboon Conflict in South Africa

**Project Summary**

 Humans and chacma baboons (*Papio ursinus*) inhabit overlapping areas in South Africa, which can be a point of conflict as humans and baboons compete for similar resources. In the Cape Peninsula, baboon incursions pose a pressing problem for residents. Baboons’ exploratory and adaptive nature allows them to successfully procure human food, which is an efficient resource. Despite a variety of techniques, people continue to struggle with managing baboons. This project evaluates physiological and behavioral implications of human-baboon conflict (HBC) and explores how perceptions of baboons might inform management techniques by surveying South Africans. Studies indicate distinct differences in primates and other animals that scavenge human food, with changes in body fat, time provisioning, and higher rates of disease, injury, aggression, and stress observed in these “urban” animals. Perceptions of baboons vary around the world but seem to be mostly negative, furthering conflict between humans and baboons. With a Silk website as the final product, this project hopes to reach and inform a wide audience of people.

**Background**

*Historical to modern phenomenon*

 Humans and baboons have inhabited overlapping areas for thousands of years in South Africa, which has lead to conflict as documented in indigenous rock art (A56), and descriptions of the first vegetable gardens on Table Mountain 300 years ago (Skead, 1980). The Cape Peninsula appears to be a modern flashpoint and hotspot for HBC. By 1998, the mortality rates of male baboons due to human conflict became so severe that only 15 adult males remained on the Cape, skewing the sex ratio dramatically (Kansky 2016). The baboon population has recovered to a more natural sex distribution after protective legislation was introduced and as of 2016, 484 chacma baboons live on the Cape Peninsula in 15 troops, 11 of which have access to human food (Kansky 2016). In recent years, the baboons have gained media attention for causing disturbances in towns and cities. CNN announced, “South Africans battle baboons in city streets” (South 2010) and the Daily Mail proclaimed the “Rise of the baboon burglars” (Mouland 2013). As the headlines illustrate, the age-old encounters between humans and baboons have progressed into a seemingly new iteration of intensified war-like conflict.

*Manifestation of conflict*

 When baboons venture into urban human environments in search of food, people commonly describe the behavior as ‘raiding.’ Kaplan et al. (2011) explains, baboons are "adept raiders" and conflict can escalate especially when baboons utilize crops fields and food stores as foraging opportunities and directly impact peoples' livelihoods (p. 1398). Baboons also commonly steal food from garbage dumps, homes, resort lodges, picnic spots, directly from humans, and in some instances baboons receive hand-outs from humans which reinforces the association between humans and food to baboons (Swedell 2011). Baboons can cause damage to property in their efforts to forage human food. Occasionally frustrated people will shoot and kill baboons even though it is illegal, or resort to using paintball guns and other non-lethal weapons to injure and scare off this protected species (Mouland 2013).

*Sources of conflict*

 A combination of factors, including overlapping habitat and baboon predisposition to utilize and adapt to a variety of circumstances, contributes to why humans in areas of South Africa clash with chama baboons. Spatial overlap between baboon habitats and expanding human settlements results in frequent encounters between baboons and people. Chacma baboons can be found over various regions in southern Africa. Stone et al. (2015) defined the central niche of chacma baboons as geographical locations falling within the range of environmental conditions the animals used based on observations of the species. South Africa protects the largest portion (8%) of the central niche area, but also has the most human populated places overlapping central niche area, including four capital cities (Stone et al.) Many very populated areas of South Africa are also very popular among baboons. Like most other baboon troops, Cape Peninsula troops choose elevated sleeping sites despite living in an environment free of predators (Hoffman and O'Riain 2012). However, Cape troops prefer sleeping in human modified habitats over available cliff and tree sites and utilizing low-lying land during the day which humans increasingly occupy (Hoffman and O'Riain 2012). One troop even slept next to hot-air vents on the roof of a confectionary factory (Hoffman and O'Riain 2012). Baboons incorporate human-modified landscapes into their daily lives with relative success.

 A very versatile species, baboons’ behavioral flexibility and omnivorous diets predisposes them to succeed in a range of environments. The traits that allow baboons to inhabit such a variety of environments like a higher propensity for innovation and complex diet (Bergman and Kitchen 2008, Swedell 2011), also prompt greater interest in human objects because baboons interpret the items as possible food sources more widely than other primates (Bergman and Kitchen 2008). Cape Peninsula baboons inhabit a naturally low-nutrient habitat in the Fynbos biome (Davidge 1978), so the higher fat, carb, and protein content in human food provides a strong incentive for baboons to forage in urban areas (Kaplan et al. 2011, Fortham Quick 1986). The stable and concentrated abundance of human food also enhances its appeal to baboons vulnerable to seasonal changes in the availability of natural foods (Fortham Quick 1986). More willing to explore human environments, baboons have identified human habitats as effective foraging locations. In a way humans and baboons exploit the same resources given the commonality between diet and land use in both species, which can position the two species in direct competition.

*Management*

Officials have tried a variety of management techniques ranging from expatriating troops, killing ‘problem’ individuals, enacting legislation against shooting baboons, educating the public, installing electric fencing, hiring baboon monitors to chase the animals away, and baboon-proofing waste management (Hoffman & O'Riain 2012). Each management technique presents various challenges and questionable sustainability. Based on the territoriality of troops around anthropogenic food sites research indicates that other troops would move in to fill the habitat of any expatriated troops (Hoffman and O'Riain 2012). The local government has experimented with various costly solutions such as the monitor program which requires an annual budget equivalent to one million US dollars to keep baboons away from residential areas (Kaplan et al. 2011). Researchers agree that a long term solution for mitigating conflict needs to reduce the appeal of human environments (Kaplan et al. 2011) and to eliminate the availability of food through secure waste management (Kaplan et al. 2011, Hoffman and O'Riain 2012).

**Research Question and Hypotheses**

 This project aims to understand human-baboon conflict (HBC) and the ways in which humans might talk about and think of baboons as a result of this conflict. What are the possible physiological and behavioral implications of HBC for baboon troops and how might human perceptions of this conflict provide insights on management techniques in South Africa? I hypothesize that the perceptions of baboons will vary depending on region based on how much personal interaction people have with baboons and that those who experience more exposure to conflict with baboons will also have a more negative perception. I hypothesize that the negative perceptions evoke warfare and thus management techniques that seem more like they are combatting baboons gain more attention than other methods like waste management.

**Methods**

*Initial Research*

 Peer-reviewed scholarly papers helped to provide insight into baboon behavior and the changes exhibited in primates exposed to urban habitats as a result of HBC. Journalistic sources such as local and international news stories and magazine articles were used to visualize and understand the documentation and representation of HBC.

*In Country Research*

 Over the course of a three week visit to South Africa, I will ask every South African that I can, a series of questions to gage perceptions of baboons. I plan to ask people for 3 words they would use to describe baboons. I will note where in South Africa respondents are from and the 3 words will be categorized as negative or associated with conflict (e.g. annoying, violent), neutral (e.g. primate), or positive words (e.g. cute). Additionally, I will ask South Africans if they have personally experienced conflict with baboons. Ideally I would also be able to observe the behavior of any urban baboons and more wild baboons throughout the trip to look for behavioral differences in aggression or willingness to approach humans. Potential challenges of in country research include possible response bias in data collection, difficulty quantifying somewhat qualitative responses, and an inability to observe baboons. I expect observations of baboons in addition to conversations with researchers at Rooi els baboon research site will be insufficient and I do not plan to use them as direct for evidence my project, but this time in country provides valuable opportunities to see the conflict in action, to reinforce or to dispel personal expectations of baboons, and to inform questions for future research.

*Final Product*

 The final product will take the form of a Silk website where I can publish and display my research and findings on HBC. Silk is a platform that allows users to create unique websites with a series of pages and to show data in various generated visualizations. On different pages I will include information on the Dartmouth College Anthropology 70 course that brought me to South Africa so that visitors to my site can learn about my project, written components for the project with research I have gathered from academic papers, final research findings, works cited, and visualizations of data and images that I will collect. Visual elements and media coverage of this topic are important aspects of HBC and my project. Using the datacard function in Silk, I will create cards with important images such as rock art, photos, and news headlines that serve as visual documentation of HBC. Visitors can then understand and see first-hand the phenomenon and language used. These images will be collected in part from my initial research and from photos taken in country. The datacards will include information about the source of the images and my analysis. Data from the survey of South Africans will be uploaded to Silk to generate visualizations. Additionally, a major appeal of the platform lies in map feature which I will use to show where in the country I interviewed people. Using my Silk site, human-baboon-conflict-in-south-africa.silk.co, I hope to show my project as well as educate the public on this subject.

**Preliminary results**

*Physiological and behavioral implications*

 Physiological and behavioral differences exhibited in other baboon species and animals that scavenge human food could serve as models for implications of HBC for chacma baboons. Olive (*Papio anubis*) and yellow baboons (*Papio cynocephalus*) that consume human food reduced the time they spent foraging and decreased their home ranges and daily traveling distances (Swedell 2011). Shorter interbirth intervals have been observed in olive baboons that practice crop and garbage dump raiding (Swedell 2011). In comparison to wild-foraging baboons, garbage feeding baboons had 21 percent more body fat, weighed 50 percent heavier, and experienced earlier maturation, higher infant survival and growth rates, and were at greater risk of cardiovascular disease from increased concentrations of insulin and cholesterol (Kaplan et al. 2011, Swedell 2011). Additionally,Saj et al. (1999) found that vervet monkeys at a Ugandan tourist site consumed more human food than wild food and that the monkeys spent close to twice as much time resting than feeding. These studies indicate that chacma baboons could similarly experience changes in time provisioning, day ranges, body fat content, growth rates, and health risks.

 Further academic research should to be conducted on the stress and aggression levels of urban baboons in association with human conflict because increases in could present a series of health problems for baboons. Sapolsky et al. (2000) found that stress is associated with higher glucocorticoid levels in baboons but "chronic overexposure [to glucocorticoid] increases the risk of glucose intolerance, hypertension, ulcers, and reproductive and immune suppression"(p. 55). Additionally, possible rises in aggression levels in urban chacma baboons could lead to health problems and disease susceptibility. Banded mongooses (*Mungos mungo)* exhibited higher inter-troop aggression levels when foraging in garbage rather than other habitats (Flint et al. 2016). 75 percent of injured mongooses contracted tuberculosis whereas uninjured individuals did not contract the disease, indicating that susceptibility to pathogens increased with injuries linked to increased aggressive behavior (Flint et al. 2016). Aggressive behavior also factors into human-induced mortality rates among baboons. Humans continue to kill more male baboons which are larger, bolder, and more aggressive, than female baboons (Swedell 2011), which could have implications for social structure in troops. While there is not enough research on how sex ratio change would impact Cape baboons, male-female dynamics have been known to affect troop culture and structure (Sapolsky and Share 2004).

*Perception*

 Cultures around the world have varied perceptions of primates and baboons that impact how they treat these animals. The similarity between humans and other primates, lead people to form expectations of about how primates should act towards people with human-like morality. Some cultures revere non-human primates and therefore oppose harming the animals, but other cultures view non-human primates as evil-doers and bad luck (Hill and Webber 2010). People often evoke militaristic symbolism to describe baboons as opposed to other primate species because people perceive baboons as moving in large organized *troops* (Hill and Webber 2010). People report that baboons destroy crops out of entertainment and seem unafraid of humans because they are willing stay in areas as long as possible before being driven out (Hill and Webber 2010). Hill and Webber (2010) explain that this behavior leads people to view baboons as particularly ‘wasteful,’’ ‘‘vindictive,’’ and "aggressive" (p. 920-21). Stone et al. (2015) note that people in South Africa consider Chama baboons and a "pest species" and a "less charismatic fauna" that is "believed to be abundant" (p. 1). HBC persists despite management techniques, so perhaps an understanding of perceptions of baboons could inform why some techniques are favored and provide direction for improving management.

**Intellectual merit**

 Intellectually, it is important to understand how anthropogenic modifications to habitats and conflict affect baboons and humans. In terms of conservation, 37 percent of African primates are classified as "vulnerable," endangered," or 'critically endangered' by the International Union for the Conservation of Nature (IUCN) (Stone et al. 2015). While chacma baboons are listed as of 'least concern,' the decline in population of a very adaptable species such as chacma baboons indicates that many more vulnerable species have already experienced even greater difficulty surviving in human occupied areas (Stone et al. 2015, p. 6). In terms of management, baboons are challenging to control, but they could also become a public health issue if diseased baboons are in close proximity to people. Understanding public perception could inform more effective management strategies to mitigate human-baboon conflict, benefiting both species.

**Broader impact**

 The opportunity for public engagement through my Silk website gives my project outward-reaching, broader impact. My site can serve as a platform for the public to understand HBC and as a potential resource for educating the public on the importance of proper management. I plan to provide contact information for the public and scholars to send in their photos, articles, and papers. I hope to make my Silk site into a collaborative collection where academics and the general public alike can come to find resources on and documentation of HBC to further the science and public awareness.

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