

Human-Lion Conflict in Southeastern Tanzania: **An analysis of causes to develop solutions**

Project's Nature & Importance

In recent years, human-carnivore conflict has intensified throughout the world due to human population growth and the resulting ecological impacts. Examples of these impacts include encroachment into wildlife areas, alteration of carnivore habitat, depletion of prey populations, and the recovery of carnivore populations due to successful conservation efforts¹. One example of this growing conflict is occurring in Tanzania where lion attacks on humans have increase fivefold since 1990 with close to 600 people killed and at least another 300 injured². These attacks are cases of lions entering human settlements and agricultural areas in search of human prey². This is unusual in that most documented cases of carnivore attacks on humans are due to mistaken encounters or sick/injured animals looking for an easy source of food. With retaliatory killing of lions common, human-lion conflict poses a threat to human welfare and lion conservation. Tanzania is home to 25-50% of all African lions³ making it a critical country for lion conservation. Not only are lions important top predators that keep the ecosystem in balance, but they are also of great economic importance to Tanzania, whose second largest foreign revenue earner is nature-based tourism. Human-carnivore conflict around the world is likely to continue increasing and research to determine the precise ecological and human factors that lead to conflict is needed in order to design effective mitigation strategies. Accordingly, my study will identify environmental and human factors leading to human-lion conflict in Tanzania.

There are few rigorous studies of carnivore attacks on humans. In the case of lions, most research has been limited to livestock depredation⁴. The few published sources on 'man-eating' lions that do exist take a case study approach or view the issue from a natural history perspective⁵. From these studies, I have identified factors that are qualitatively linked to attacks, including climate, vegetation type, and lion and human population densities. The only analytical study of lion attacks examines the problem at the district level and shows a link between attacks and bush pig presence, low prey availability, seasonality, and certain human activities². While undertaking preliminary fieldwork for my study during the summer of 2005, I determined that attack location and human behavior vary on a finer scale than the district-level scale used for previous analyses; within districts, attacks happen repeatedly in certain localized areas and people undertake activities differently between villages. To account for this variation, my research will not only quantitatively analyze the factors linked to attacks, but it will do so at the village-level. In addition, by using interdisciplinary methodologies to look at both social and ecological factors, I am taking a holistic approach and examining all aspects of the problem with the understanding that a combination of both environmental and human factors are likely responsible for attacks.

Work Plan

My research objectives are to (1) determine where and how often people and lions are coming into contact; (2) characterize and compare how people undertake activities that put them at high risk for attack; (3) identify the ecological and human factors influencing the location and

timing of attacks. To accomplish these objectives I will travel to Tanzania in 2006-2007 to conduct fieldwork for my project. My research will take place in the two Tanzanian districts most affected by lion attacks since 1990. These locations represent two distinct district characteristics requiring different mitigation strategies: one contains part of a major protected area and a source of wild lions, while the other has no obvious source of wild lions. Since other affected districts generally fall into these categories, I can extrapolate my results to other regions.

I will use interdisciplinary methodologies including interviews, camera traps, and mapping to collect the necessary data. Fieldwork will occur in two stages. During my first field season (June-August 2006), I will map attack locations. I will then return to Minnesota to analyze locations and select villages for in-depth study. From January-June 2007, I will revisit Tanzania to conduct interviews and collect data on lion presence. Upon completion of my fieldwork, I will use newly collected as well as existing current and historical data to create maps of lion attacks, rainfall, temperature, land cover/land use, lion presence, lion-prey presence, bush pig presence, characterized human activities, and human population density. I will use these maps to identify spatial and temporal trends in lion attacks and determine which specific environmental and human factors work in combination to cause attacks.

As of June 8, 2005, I have approval from the Institutional Review Board to conduct this project. In addition, I have the necessary research permits from the Tanzanian government. I am currently seeking funding to support fieldwork for my project. Funds requested from the University's Consortium on Law and Values in Health, Environment & the Life Sciences will pay for airfare and a summer stipend that will be use for room and board while abroad.

Implications

My project directly examines issues of health, the environment, and life sciences by researching and developing solutions for an environmentally critical and life-threatening problem. The nature of my research is interdisciplinary at its core; I will draw on methods and theories from the fields of ecology, sociology, anthropology, and geography. Taking an interdisciplinary approach to an ecological problem is critical to ensuring that my research goes a step beyond identifying the causes for human-lion conflict, and leads to the development of specific and viable solutions for this urgent problem. My study will provide critically needed information to the Tanzanian government and wildlife officials on how to minimize attacks, and will provide the broader scientific community with an analysis of the factors leading to human-carnivore conflict. By identifying the driving ecological forces behind attacks and determining feasible solutions to this conflict, my project will save human lives and help maintain Tanzania's lion populations. If we can make strides towards reducing these conflicts in Tanzania, this research can serve as a model towards reducing human-wildlife conflict across the globe.

Literature Cited

- Treves A. and K. U. Karanth. 2003. Human-carnivore conflict and perspectives on carnivore management worldwide. *Conservation Biology* 17(6):1491-1499.
- ² Packer, C., D. Ikanda, B. Kissui, & H. Kushnir. 2005. Lion Attacks on Humans in Tanzania. *Nature* 436: 927-928.

- ³ Bauer, H. & S. Van Der Merwe. 2004. Inventory of free-ranging lions *Panthera leo* in Africa. *Oryx* 38(1): 26-31.
- ⁴ Loe J. and E. Roskaft. 2004. Large carnivores and human safety: A review. *Ambio* 33(6):283-288.
- ⁵ Peterhans J. C. K. and T. P. Gnoske. 2001. The science of 'man-eating' among lions *Panthera Leo* with a reconstruction of the natural history of the 'Man-Eaters of Tsavo'. *Journal of East African Natural History* 90:1-40.

Biography

Hadas Kushnir is currently a second year Ph.D. student in the Conservation Biology Program at the University of Minnesota where she is also a MacArthur Scholar. She attended Barnard College of Columbia University where she majored in Environmental Biology and graduated summa cum laude and Phi Beta Kappa in 2001. As an undergraduate, she spent a semester at the Biosphere 2 Program in Oracle, Arizona and a semester in Kenya, studying wildlife management with the School for Field Studies. Before attending graduate school, Hadas worked for the City of New York Parks & Recreation Natural Resources Group, where she was the grants coordinator and a field ecologist, involved in planning and implementing small scale community-based restoration projects in the South Bronx.

In summer of 2005, Hadas traveled to Tanzania to undertake preliminary research for her project. During this 10-week experience, she studied Swahili and visited three districts affected by lion attacks in order to develop methodologies for her dissertation and pilot her questionnaire on high-risk activities. Hadas met with local government officials and interviewed people in 12 villages, all of whom were supportive of her investigation of the problem. This experience has greatly influenced the development of her project and prepared her for her upcoming dissertation research. The summer of 2006 will be Hadas's fifth visit to Africa and third trip to Tanzania. She is well equipped for her proposed research and the challenges of working abroad.

Faculty Advisors

Dr. Steve Polasky, Fesler-Lampert Professor of Ecological/Environmental Economics

Dr. Craig Packer, Distinguished McKnight University Professor, Ecology, Evolution & Behavior

Budget

Item	Unit	Quantity	Cost	Total
Salary				
Summer 2006*	Summer	1	\$4,898	\$4,898
Spring 2007**	Semester	1	\$7,000	\$7,000
Field Assistant Salary***	Month	9	\$500	\$4,500
Transportation				
Airfare*	Flight	2	\$2,000	\$4,000
Gas	Month	9	\$500	\$4,500
Vehicle Maintenance	Month	9	\$150	\$1,350
Equipment				
Digital Tape Recorder	LS	1	\$150	\$150
GPS Unit	LS	1	\$600	\$600
TOTAL BUDGET				\$26,998
Amount Requested from the Consortium				\$6,898

* Funds being requested from the University's Consortium on Law and Values in Health, Environment & the Life Sciences include summer salary (rate based on salaries given to Ecology, Evolution & Behavior graduate students) and roundtrip airfare for one flight to Tanzania. Salary will be used for room and board costs while abroad.

** Salary for the spring semester will be provided by the MacArthur Interdisciplinary Program on Global Change, Sustainability, and Justice

*** Field assistant salary will be paid for by Savannas Forever, a new University of Minnesota based non-profit research organization working in Tanzania

Additional Funding Pending or Sought

Funding Source	Application Due Date	Estimated Notification Date
NSF Graduate Research Fellowship	November 2, 2005	March 2006
EPA STAR Fellowship	October 18, 2005	March 2006
Women's Club of Minneapolis	December 1, 2005	March 2006
Applied Ecological Services	January 1, 2006	March 2006
The Explorers Club Exploration Fund Grant	January 31, 2006	April 2006
The Lewis and Clark Fund for Exploration and Field Research	March 15, 2006	May 2006
WCS Research Fellowship	September 1, 2006	November 2006
WCS Kaplan Award for Wild Cat		

Conservation	September 1, 2006	November 2006
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