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Carnivores, culture and 'contagious conflict': Multiple factors influence perceived problems with carnivores in Tanzania's Ruaha landscape

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ABSTRACT

Resolving human-wildlife conflict is a conservation priority, but effective mitigation requires in-depth understanding of the complexity and relative importance of conflict drivers. We conducted 262 semi-structured interviews with villagers around Tanzania's Ruaha National Park. The surveys provided data on respondents' perceived problems with wildlife, knowledge, reported killing of carnivores, and their socio-economic characteristics. 98.5% of people perceived a problem with wildlife, and respondents viewed large carnivores as significantly more problematic than other species, due to the threats they posed to livestock and humans. Despite this, only 7.3% of people admitted to having killed any large carnivores. Depredation was widespread, having affected 61.1% of households, but was less important than other forms of stock loss – monthly recall data revealed 1.2% of stock were predated, compared to 9.1% lost to disease and 2.8% to theft. Although experience of depredation significantly predicted negative attitudes towards carnivores, it was not the most important factor. The study raises the possibility of 'contagious conflict', where perceived problems with one group of species were strongly associated with perceived problems with others. Furthermore, factors such as ethnic group and religious beliefs were significant predictors of perceived problems. This study suggests that effective conflict mitigation should involve measures to improve attitudes towards a broad range of species, rather than a single taxon, and that action should be taken to also address the social and cultural drivers of conflict, rather than merely focusing upon reducing wildlife damage.

1. Introduction

Human-wildlife conflict is a pressing conservation issue and can have extremely damaging impacts both on human communities and wildlife populations (Loveridge et al., 2010; Thirgood et al., 2005). This conflict has been defined by the World Wide Fund for Nature (WWF) as 'any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment' (WWF, 2005), which covers a very broad range of scenarios. Here, we consider three key aspects of conflict: how problematic people consider wildlife to be; the damage reportedly imposed by wildlife on people; and the reported killing of wildlife by people. Large carnivores such as lions (*Panthera leo*), spotted hyaenas (*Crocuta crocuta*), grizzly bears (*Ursus arctos*) and grey wolves (*Canis lupus*) tend to cause particularly intense conflict, as they pose a severe, direct threat to peoples' livestock (which are often vital economic and social assets) as well as to humans themselves (Holmern et al., 2007; Loe and Roskaft, 2004; Packer et al., 2005; Sommers et al., 2010). Such species can have devastating impacts, as even relatively low levels of stock loss can impose intolerable costs on poor households (Jackson et al., 2010; Yirga and Bauer, 2010). People commonly respond to this threat by killing problematic wildlife, either pre-emptively or in response to damage (Thirgood et al., 2005). Conflict with humans has been one of the key drivers of widespread large carnivore declines (Woodroffe et al., 2005), and has been highlighted as the main threat facing remaining lion populations in East Africa (Frank et al., 2006), as well as a significant threat to species such as African wild dogs (*Lycaon pictus*) and leopards (*Panthera pardus*) (Ray et al., 2005).

Mitigating conflict is therefore a priority for large carnivore conservation (IUCN, 2006, 2007a; Ray et al., 2005). However, effective

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mitigation relies upon an in-depth understanding of the magnitude and drivers of human-wildlife conflict at a local level – for instance, if antagonism towards a species actually reflects hostility towards protected areas, the government or other groups, then reducing damage caused by that species is unlikely to significantly reduce conflict (Knight, 2000). Despite increasing recognition of this need to understand the complexities of conflict (Dickman, 2010), there is a paucity of data on the extent and drivers of conflict in many important wildlife areas. For instance, Tanzania's Rungwa-Ruaha region, which includes the Ruaha National Park (at 20,300 km^2, the largest National Park in Tanzania), is one of the most important areas in the world for wildlife: it is a priority landscape for threatened species such as the African elephant (*Loxodonta africana*) (Stephenson and Ntiamoa-Baidu, 2010), harbours two Important Bird Areas (WCS, 2005) and is a hotspot for carnivore biodiversity (Mills et al., 2001). It supports over 10% of the world's remaining lions (Riggio et al., 2013), one of only four cheetah (*Acinonyx jubatus*) populations in East Africa numbering over 200 adults (IUCN, 2007a), the world's third biggest population of African wild dogs (IUCN, 2007a; IUCN, 2007b), and important populations of leopards and spotted hyaenas. This landscape includes a mosaic of land-uses, including the Park, Game Reserves, Wildlife Management Areas and village land, with anecdotal evidence of intense human-carnivore conflict and frequent carnivore killing. As conflict on reserve boundaries can have significant impacts even on populations within protected areas (Woodroffe and Frank, 2005), it is crucial to determine the intensity and drivers of human-wildlife conflict in important, reserve-adjacent areas such as this one. We examined local attitudes towards wildlife on village land in the Ruaha landscape, as well as the degree of damage caused by carnivores and the level of reported carnivore killing, and investigated which factors were linked to more negative attitudes. We hypothesised that people would perceive wildlife, particularly carnivores, in the Ruaha landscape to be problematic, and the degree of perceived problems would be affected by personal experiences, particularly depredation. However, given widespread local antagonism towards Ruaha National Park, particularly from pastoralists (Dickman, 2009), we also hypothesised that socio-economic factors, such as ethnic group and vulnerability, would also affect how problematic people viewed wildlife to be. Our goal was to test these two hypotheses and use the results to help guide future conservation approaches in this globally important landscape. Furthermore, this study can act as a valuable model, by highlighting some of the rarely-considered social factors which may affect attitudes towards wildlife in the many other locations where conflict is a major conservation issue.

2. Materials and methods

2.1. Study area

The study was conducted on village land associated with the Pawaga-Idodi Wildlife Management Area (PI-WMA), a 750 km^2 area adjoining the south-eastern border of Tanzania's Ruaha National Park (RNP) (Fig. 1). This area is part of the Rungwa-Ruaha region, which covers over 45,000 km^2 and encompasses the 20,300 km^2 RNP and its adjacent Game Reserves as well as the PI-WMA and village land, which provides vital dry season habitat for many of RNP's species (Dickman, 2005). All 22 villages close to Ruaha are located in the 750 km^2 area mentioned above, and surveys were conducted in 19 of them to provide a representative sample. Survey households were located from 07°19′S to 07°36′S and from 35°05′E to 35°29′E. The Ruaha landscape is one of outstanding biodiversity and species endemism (WCS, 2005) and is within one of the 'Global 200' ecoregions (Olson and Dinerstein, 1998). It has further ecological significance as the only protected area system representing the transition between the East African *Acacia-Commiphora* zone to the southern African *Brachystegia* or Miombo zone (Williams, 1999). The climate is semi-arid to arid, with approximately 500 mm of rainfall annually, while the vegetation is a mix of East African semi-arid savannah and Zambezian *miombo* woodland (Sosovele and Ngwale, 2002).

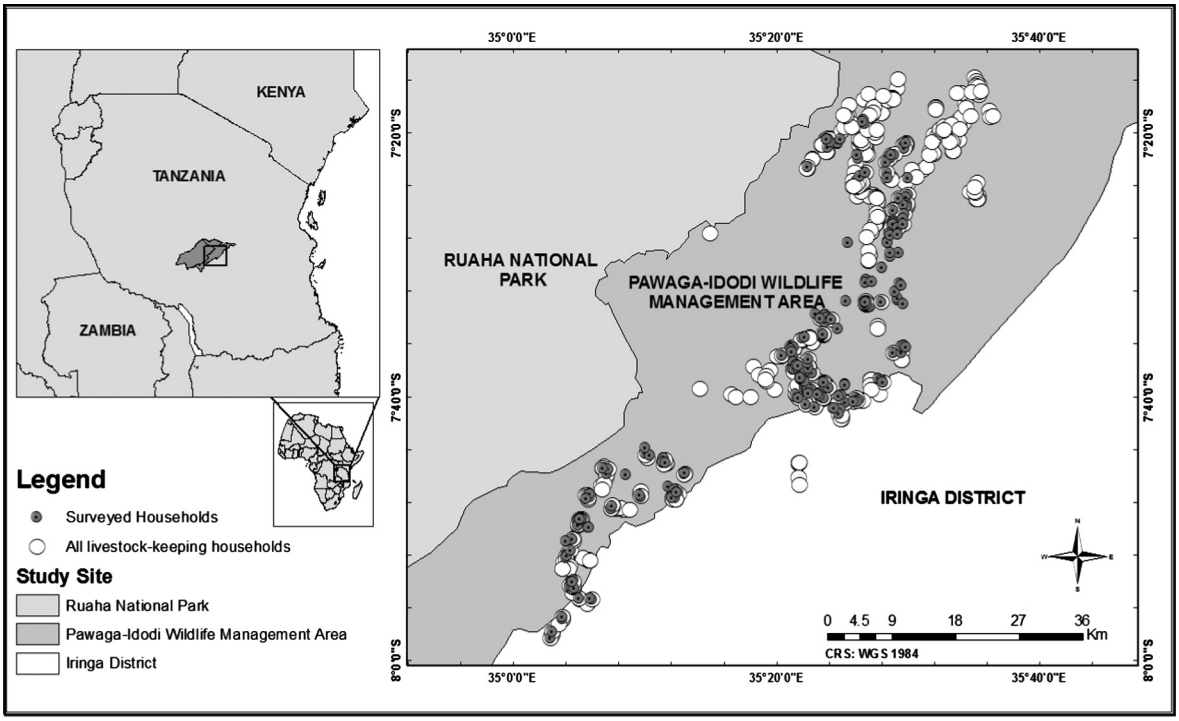

Fig. 1. Map of the study area, showing the surveyed households (n = 262) as dark circles and all livestock-keeping households (n = 516) as white circles.