Local attitudes and perceived threats of human-elephant conflict: a case study at Lake Jipe, Kenya

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Abstract

Opportunity costs of human–elephant conflict are complex and pose diverse challenges to both humans and elephants, whether real or perceived. In the Lake Jipe area, on the western boundary of Tsavo West National Park in Kenya, people see elephants in their vicinity almost daily. This expanding community is facing complex challenges as fishing, the main source of income, has declined substantially and the community is becoming more aware of the presence of elephants. We conducted a rapid rural appraisal using semi-structured interviews and questionnaires within three lakeside fishing villages to better understand how these changes within the community, and how tensions among stakeholders are affecting interactions with elephants. The results were complemented by data from two years of GPS tracking data of an elephant that was frequently present in the communities. Perceptions and attitudes of the community towards elephants were analysed and the 'conflict to coexistence continuum framework' was applied to determine the state in which this community exists in relation to elephants. Our findings suggest that worsening socioeconomic issues such as unsustainable income sources, food insecurity and human–human tensions play an important role in influencing risk perceptions and increasing perceived conflicts with elephants. In the three villages studied, risks and benefits, and relations among stakeholders are likely to determine whether community interactions with elephants shift towards coexistence or conflict. We argue that the increasingly vulnerable livelihoods observed in these communities may shift their position within the continuum towards one of intolerance and conflict with elephants in the future.

Résumé

Les coûts d'opportunité des aux conflit humains-éléphant sont complexes et posent divers défis tant aux humains qu'aux éléphants, qu'ils soient réels ou perçus. Dans la région du lac Jipe, à la limite ouest du parc national de Tsavo West au Kenya, les gens voient des éléphants dans leur cour presque tous les jours. Cette communauté en expansion est confrontée à des défis complexes car la pêche, principale source de revenus, diminue considérablement et la communauté devient de plus en plus consciente de la présence des éléphants. Nous avons mené une évaluation rurale rapide dans trois villages de pêcheurs au bord du lac pour mieux comprendre comment ces changements au sein de la communauté, associés aux tensions des parties prenantes, affectent les interactions avec les éléphants. Notre étude a combiné deux ans de données de suivi GPS d'éléphants, d'entretiens semi-structurés et de questionnaires. Les perceptions et attitudes de la communauté à l'égard des éléphants ont été analysées et le «cadre du continuum du Conflit à la Coexistence» a été appliqué pour déterminer l'état dans lequel cette communauté existe par rapport aux éléphants. Nos résultats suggèrent que l'aggravation des problèmes socio-économiques tels que les sources de revenus précaires, l'insécurité alimentaire et les tensions entre humains, joue un rôle important en influençant la perception des risques et en augmentant les conflits perçus avec les éléphants. Dans cette étude de cas, la perception du risque, la perception des avantages et les relations avec les parties prenantes déterminent si les interactions de la communauté avec les éléphants peuvent évoluer vers la coexistence ou le conflit. Nous soutenons que les moyens de subsistance de plus en plus précaires observés dans ces communautés pourraient changer leur position dans le continuum vers une position d'intolérance et de conflit avec les éléphants à l'avenir.

Introduction

Managing the competition for space and resources between people and wildlife is one of the most complex issues in modern-day conservation. Where elephant ranges and human settlements overlap, this competition intensifies and human–wildlife interactions become increasingly common. These interactions vary in intensity, scale, frequency and may generate positive or negative experiences (Frank 2016; Nyhus 2016). Negative interactions, mostly human–wildlife conflict (HWC), are exacerbated by growing human populations living near protected areas, resulting in habitat loss and fragmentation (Ogutu et al. 2016). The wide-ranging nature of African elephants (*Loxodonta africana*) means they are particularly prone to interactions with humans.

Recent studies have proposed looking at human–wildlife interactions as complex occurrences that can involve both positive to negative interactions and can vary in intensity (Yurco et al. 2017; Frank and Gilkman 2019). Moreover, attitudes and behaviours towards a species may vary over time, in degree and across space, depending how the relationship between humans and wildlife evolves (Frank and Gilkman 2019). Frank (2016) proposes a theoretical framework that categorises these complex interactions along a 'conflict to coexistence' continuum. This continuum contributes to understanding of how human–human and human–wildlife interactions may influence individual attitudes or behaviours and motivate a shift in position along the continuum, either towards conflict or towards coexistence.

Perceptions towards wildlife are complex and diverse, driven by numerous factors such as individual and societal values, culture, personal experiences, emotions, education and wealth (Manfredo and Dayer 2004; Kansky et al 2016). Attitudes are formed through sets of beliefs or sentiments (Heberlein 2012) and these subjective evaluations can determine whether interactions with wildlife are perceived as a 'conflict' or 'coexistence'. Therefore, attitudes and perceptions shape the scope of an interaction, and affect one's ability to endure the costs associated with the presence of wildlife (Bruskotter and Wilson 2014). Attitudes also shape ideas of risk (Frank and Gilkman 2019). Often there is disparity between perception of risk and the actual degree of risk present, and this mismatched perception can fuel negative attitudes towards wildlife even if fatalities or monetary losses from wildlife interactions are relatively low (Dickman 2010).

Incidents of human–elephant conflict can be a major obstacle that undermines successful community engagement in conservation practices, rural development and efforts to improve livelihoods (Nyhus 2016; Shaffer et al. 2019). As populations expand into once sparsely populated areas there is a growing need for appropriate community conservation approaches. It is therefore important to move beyond unilateral approaches towards HWC and develop a broader awareness of the multiple dimensions and drivers of conflict.

Lake Jipe is located on the western boundary of Tsavo West National Park in Kenya, in a landscape in which interactions between elephants and people are becoming more frequent. Although the area is an important dry season refuge for elephants and other wildlife, it has undergone severe ecological degradation, which in turn is negatively impacting the livelihoods of local communities. We conducted a rapid rural appraisal within three lakeside fishing villages to better understand how socioeconomic factors such as unsustainable livelihoods, stakeholder relationships and interactions with elephants influence people's perceptions and attitudes towards elephants. The results were complemented by data from two years of GPS tracking data of an elephant that was frequently present in the communities.

Methods

Study site

Lake Jipe is a shallow, transboundary freshwater lake situated at the eastern base of the North Pare Mountains on the border between Kenya and Tanzania. It has a maximum surface area of approximately 30 km², a depth not exceeding 3 m and is fed primarily by the rivers Lumi and Ruvu that originate on Mt. Kilimanjaro approximately 60 km to the north-east. The Lake Jipe basin has a semi-arid climate with average annual rainfall of 600–700 mm, primarily occurring within the March–May and October–December rainy seasons. On the Kenyan side, a

section of the northern shore lies within Tsavo West National Park (NP), which is part of the ~42,000 km^2 Tsavo Conservation Area and home to Kenya's largest single population of elephants. The remainder of the lake is within Mata Ward, Taita Taveta County. Here, there are four villages with a total human population of 6,524 (Kenya Bureau of Statistics 2019).

Despite lying entirely within Taita Taveta County, the local population consists of various ethnic groups, predominantly Taita, Maasai, Luhya and Luo, that have developed a common culture. It is believed that the area was first settled by Tanzanians fleeing conscription during World War 1, and further populated by Kenyan refugees evicted from the Tanzanian shores of Lake Jipe during the 1961 national census. In the late 1980s, the Lake Jipe Settlement scheme famously failed when the majority of new land titles intended for the local population were given to officials in the Department of Lands and Government.

Lake Jipe is a biodiversity-rich ecosystem surrounded by swamp and various wetland habitats. The lake itself is home to the endemic Jipe tilapia (*Oreochromis jipe*), and a wide variety of bird species, including many that are endemic and/or of conservation concern. The Lake Jipe ecosystem provides the main source of income in the region (Ndetei 2006). Primary livelihood activities of the residents of villages surrounding Lake Jipe include fishing and animal husbandry.

As a result of the intensive use of natural resources in what is relatively small system, severe ecological degradation has occurred since the 1970s, and this has had profound impacts on the livelihoods of local people. Deforestation and unsustainable agriculture within the catchment area have resulted in vastly increased soil erosion and subsequent siltation, salinity and turbidity of the lake. These, in combination with unregulated fishing, have caused a near total collapse of the fishery (Ndeteti 2006).

Data collection and analysis

On 11–13 November 2019, in order to understand the socioeconomic conditions of the community and perceptions towards elephants, we carried out a rapid rural appraisal in the three lakeside villages of Kachero, Mkocheni and Mkwajuni, home to approximately 500 permanent residents. We carried out fifteen 90-minute semi-structured interviews and conducted 63 –× thirty-minute questionnaires. Respondents for questionnaires were selected at random in each village based on availability and willingness. The 15 interviewees were selected based on their roles in the area involving a high degree of social interaction with a wide range of community members. Two anonymous Kenya Wildlife Service (KWS) representatives were also selected for interview as key interviewees.

Interview data was first analysed by manually coding opinions to identify emerging themes from the interview transcripts. Full interview transcripts were analysed to group similar opinions under the pre-identified research themes 'socioeconomic context', 'human–elephant interactions' and 'attitudes and perceptions'. We then used axial coding (Saldaña, 2015) to identify relationships between the themes; for example, how 'socioeconomic context' relates to 'attitudes and perceptions'.

In a complementary analysis, to understand the presence of elephants in the community, we analysed elephant movement data from a bull elephant, Manolo, who was collared close to Lake Jipe in January 2018. Manolo is typically found with a group of bull elephants varying from four to seven individuals. The Savannah Tracking GPS collar was set to record hourly location fixes, and we used 24 months of tracking data (from 1 February 2018 to 31 January 2020) to determine the time Manolo spent in the four different land use types: (1) protected areas; (2) Lake Jipe community land; (3) lake and reed beds; and (4) other community land outside of our study site. Time spent within each of these land use types was further analysed by month and by day–night ratio.

Results

Socioeconomic context

Across the three villages, there were no significant differences among our 63 interview subjects in terms of years of residence, family size, number of household members and monthly income. Data from all three villages were therefore pooled for further analysis. The principal challenges identified by the community were perceived conflicts with wildlife (cited as a challenge

by 29% of respondents), access to drinking water (15%) and access to food (14%) (fig. 1).

Fishing was the main income generating activity for 52% of respondents and the main source of food for 66% of respondents. However, declining fish yields have led to food insecurity and 87% of respondents reported having experienced food scarcity in the 12 months prior to interviews. The vast majority (95%) of the respondents to the questionnaire stated that the

fishing industry in Lake Jipe has changed over time, and that fishing as an income generating activity is unsustainable because of decreasing size of fish and yields (47%), lake degradation as a results of increased sedimentation and pollution (33%) and competition over lake resources with wildlife (17%) (fig. 2).

When respondents were asked what alternative sources of income are available, 73% stated that there are no alternative income generating opportunities available. Agriculture could possibly provide an
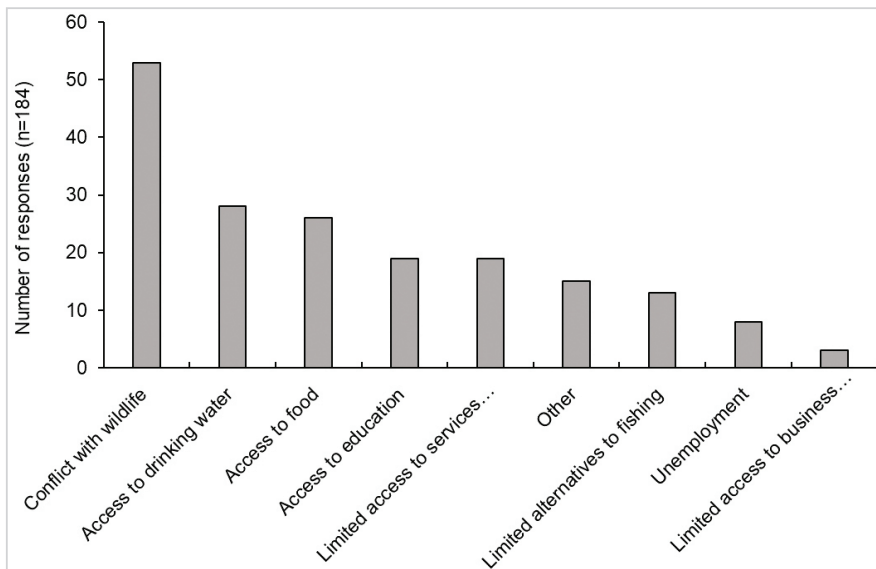

Figure 1. The main challenges facing communities in Lake Jipe.
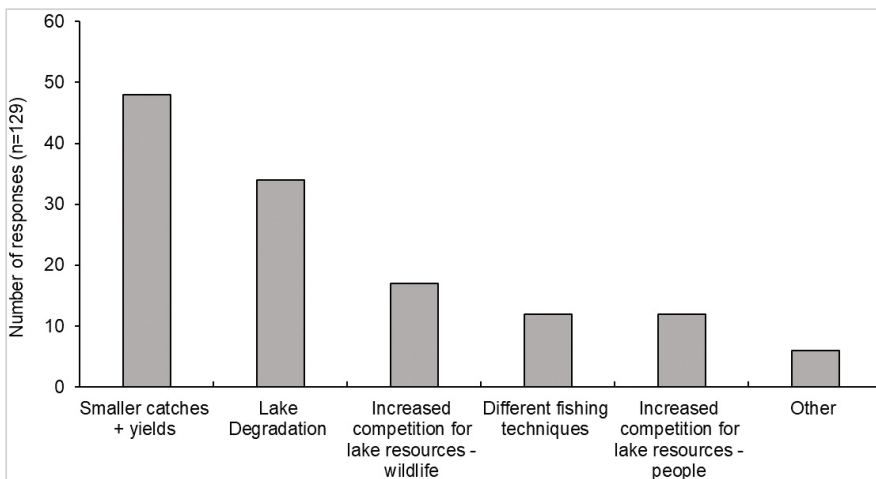

Figure 2. Perceived factors impacting changes in Lake Jipe over time.

alternative; however, as one respondent (JP03) explained: *I don't like to live with elephants because they threaten our lives, and destroy our crops. We have land but we cannot use it. There is no fence and there is no way for us to protect our crops.*

Understanding human-elephant interactions

Elephant sightings within the Lake Jipe communities are a common occurrence, and 73% of respondents stated they saw elephants daily. The number of elephant interactions and sightings were perceived to have increased over recent years. Some elephants were said to have become "local residents", including the collared elephant Manolo (fig. 3).

Analysis of two years of tracking data showed that Manolo had a home range of 1824.66 km^2 (Minimum Convex Polygon) and spent 43% of time in the Lake Jipe community area, 36% in protected areas (Tsavo West NP in Kenya and Mkomazi NP in Tanzania), 17% in the lake or reed beds, and 4% in other community land, including the Taita ranches and community land in Tanzania (fig. 4).

Manolo spent time in both the Tsavo West NP and Mkomazi NP in all months of the study period except for March 2019. Only during May and June of both 2018 and 2019 was Manolo

entirely absent from the Jipe area.

Of those interviewed, 71% claimed to have had negative interactions with elephants, 13% reported to have had positive interactions and 16% had had no interactions. Common complaints about elephants included: (1) elephants blocking travel routes including for students going to school; (2) elephants chasing people and (3) elephants damaging vegetable plots by crop raiding (fig. 5).

Respondents recalled one human fatality and three injuries caused by elephants within the last decade. Such incidents were reported to occur in the evening when elephants come out of the lake and when visibility is poor.

Respondents perceived elephants to be more aggressive than they were in the past (during the 70s and 80s) and this, they maintained, explains recent human injuries and fatalities. Of those interviewed, 55% said they felt fearful during elephant encounters and could not take action as elephants were unresponsive to deterrents.

Perceptions and attitudes towards elephants

Positive attitudes towards elephants were expressed by 13% of respondents; they like seeing elephants around yet still fear them. Several interviewees acknowledged they felt privileged to have elephants in their "backyard", but 46% of the respondents believed elephants should remain in the National Parks and

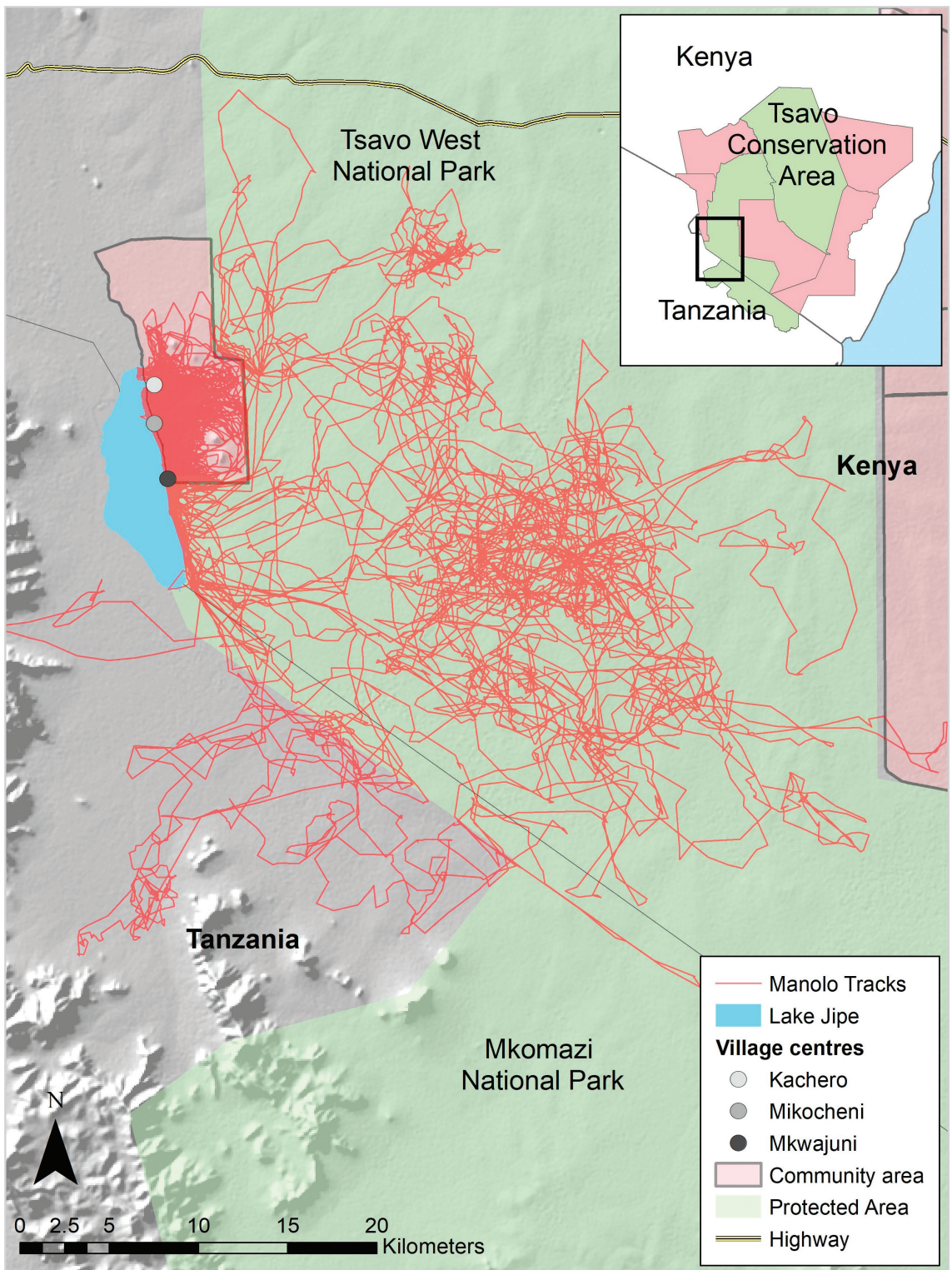Figure 3. Collared elephant, Manolo, walking by Mikocheni village, Lake Jipe.

Figure 4. Collared elephant Manolo's movement over two years, highlighting the concentration of time he spent in and around the Lake Jipe shoreline area (February 2018–January 2020).
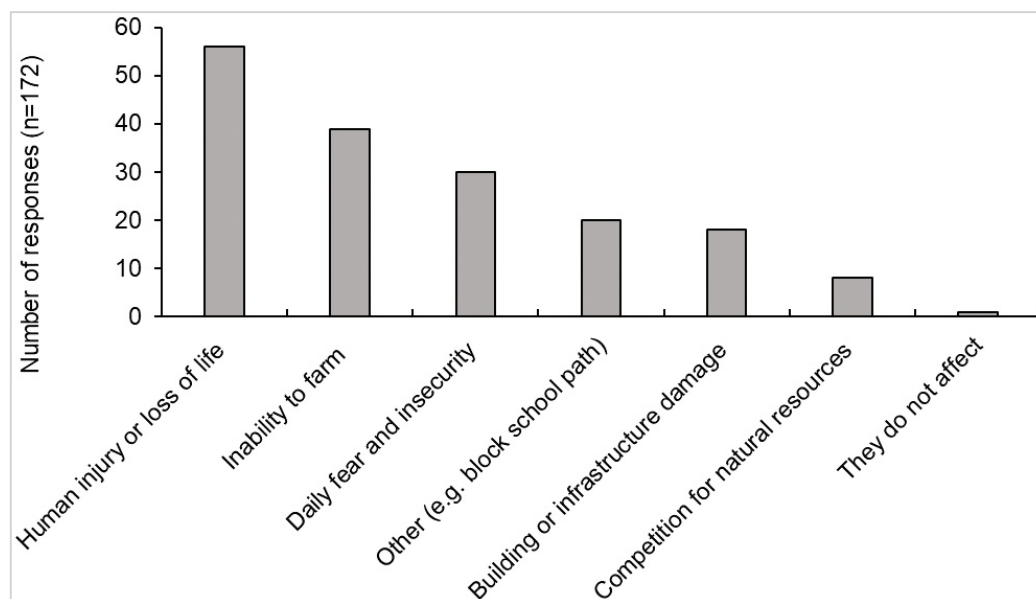
Figure 5. Responses of the perceived threats from elephants, affecting the Lake Jipe communities.

89% of respondents stated they did not see any benefits from elephants. Respondent JP01 said *Elephants are used to us now, but we see them as pests, we have no business with them*. The KWS interviewees confirmed that the community does not receive any benefits from wildlife because the tourism industry in this remote corner of Tsavo West NP is not yet well developed.

Most respondents (89%) felt that Kenya Wildlife Service (KWS) provides no support to deal with elephants despite being the government authority responsible for managing wildlife.

The key interviewees stated that the community exhibits tolerant attitudes towards elephants despite bearing the costs of living with them. For example, the community supports KWS by reporting possible poachers and illegal bushmeat hunters. However, there was a widespread perception that elephants are given first priority; the informants explained that KWS protocols preclude immediate and intervening action, while responses to human injury or death often take time. One notable problem bull elephant that eventually caused a human fatality was shot by KWS in response to community pressure. The interviewees maintained that the organisation does support the community and recalled how

in the past KWS provided vehicles for transporting school children when high numbers of elephants were present. One respondent described further plans to support the community but explained that funding is too restricted to support these initiatives at present.

Discussion

Our findings indicate that the Lake Jipe communities are in a state of passive coexistence with elephants, whereby individuals display mixed attitudes and behaviours. For example, community members generally do not hold positive attitudes towards elephants, but do not take action against the elephants such as retributive killing and would report suspected poachers to KWS. Their heightened vulnerability due to lack of sustainable income sources, food insecurity and human–human tensions is a potentially important driver of a behavioural shift to a future state of conflict.

Socioeconomic context

The Lake Jipe community relies on fishing as its main source of both income (52%) and food (66%). However, recent land-use changes and overexploitation have resulted in decreasing yields and drastic impacts on the local fishing industry. Accordingly, 87% of our survey participants reported

experiencing food scarcity in the last year. In an effort to replenish the heavily depleted fish stocks, the Kenya Fisheries Department has introduced strict regulations banning small-mesh fishing nets. This attempt to regulate offtake potentially reduces accessibility to this key livelihood resource, thereby increasing the vulnerability of the community to risks (Robinson et al., 2014). In practice, regulations are poorly enforced and use of these unsustainable fishing practices remains commonplace. Whether or not the regulations are enforced, the overreliance on a single resource for both food and income reduces the resilience of the community to the inherent risks of living with wildlife. For the Lake Jipe residents, this has translated into negative attitudes towards elephants.

HWC in already vulnerable socioeconomic settings can exacerbate existing problems such as poverty, social inequality, and feelings of oppression (Jadhav and Barua 2012). This aggravation and inability to meet basic human needs can lead to elephants being used as 'lightning rods' for unrelated problems associated with poverty and lack of centralized social support (Lee and Graham 2006). Some community members believe that elephants and local poverty are closely interlinked, as respondent JP03 succinctly said: …*elephants are better off in the park as they contribute to poverty*.

Members of the community believe they cannot farm due to the obvious risk of elephant crop-raiding and so have very limited alternative livelihood options. This perceived limitation of additional income opportunities and worsening of poverty could become a motivation to engage in wildlife crime. Travers et al. (2019) found that illegal hunters in Uganda admitted engaging in wildlife crime because of the lack of alternative incomes. A community elder we interviewed expressed concern about the youth in the community by suggesting they may turn to poaching when they become desperate.

Human-elephant interactions

Elephant behaviour and risk perception are factors identified in this study that influence human–elephant interactions and could contribute to future conflict. The absence of risk-avoidance behaviour by the collared bull, Manolo, highlights habituation towards humans. During the study period, Manolo spent a large proportion of his time in community land and often moved through the community during daylight hours. This is contrary to risk-avoidance behaviour of displayed other African elephants, that typically travel at night and move quickly across human settlements (Douglas-Hamilton et al. 2005; Ihwagi et al. 2019).

The resident elephants of Lake Jipe appear to be accustomed to residing in close proximity to settlements. These elephants are also reported to be unresponsive to any mitigation measures used by the community. Respondent JP06 remarked, *elephants nowadays are not afraid of humans; they are digital elephants. They can pass by the house and are unperturbed*. As a result, the majority of community members (55%) have had to adopt a 'stand back and wait' response upon encountering an elephant. This passive reaction may have led these elephants to perceive minimal risk and so assume safe passage to the lake. However, this bold behaviour may cause community members to feel a lack of control and therefore vulnerability during encounters. Increased risk perception and fear towards elephants are both regarded as key drivers of hostility towards wildlife (Dickman 2010).

Perceptions and attitudes towards elephants

The perceived costs of living with elephants resulting from interactions such as: being chased, blocked from travelling, and feelings of fear of injury or death, increase the perception of risk. This negatively influences attitudes and, thus, tolerance towards elephants, 'a trait commonly seen in other elephant populations'. Usually, public outcry is not directly proportional to the actual HWC; instead, as is the case at Lake Jipe, negative attitudes are based on the perception of potential risk, as well as lack of control over the conflict (Madden 2004).

Additionally, perception of benefits plays a key role in influencing attitudes towards elephants. When perceived costs outweigh perceived benefits, attitudes towards conservation of a particular problem species become increasingly negative (Kansky et al 2016). Respondents to our questionnaire stated that elephants do not benefit the community. Although there is a tourist lodge near the community, it only employs six local people. Other than these few individuals, wildlife tourism revenue has not trickled down sufficiently to

positively influence community perceptions of the value of elephants.

Societal mistrust in the management authorities is another important component that influences acceptability of a problem species (Bruskotter and Wilson 2014). In the case of Lake Jipe, community members feel that they do not have adequate support when dealing with elephants and that wildlife needs are given priority over theirs. Perception of bias of this kind is often present in situations where there is disagreement among parties to a dispute (Kennedy and Pronin 2008) and can play a critical role in the escalation of disagreements into resentment and conflict. When deep-rooted disagreements between stakeholders go unaddressed, they may be portrayed as the main origin of HWC whereas, in fact, they are conflicts between humans (Manfredo 2015). Conflict in Lake Jipe could be worsened in the future if the existing tensions between the community and KWS are left unaddressed.

Madden and McQuinn (2014) explain that complex and deep-rooted conflicts are often reinforced by inadequately addressed micro-conflicts. The latest incident in 2017, in which a young woman was seriously injured by elephants is the most frequently cited instance where KWS is criticized for its poor response. This event continues to elicit strong negative attitudes towards KWS because community members feel that KWS staff provided inadequate support and compensation. The KWS representatives we interviewed asserted that the community may misinterpret the (continuing) delay in providing compensation as lack of support, but that compensation will be paid in accordance with KWS policy. At the time of our interviews (November 2019), KWS had only paid compensation for claims up to 2016, and this incident occurred in 2017. Unfortunately, in disputes with underlying conflicts such as this, new incidents may carry additional meaning acquired from past interactions (Madden and McQuinn 2014). Therefore, each new incident of human–elephant conflict could elicit increasingly severe responses from the community.

Conclusion

This study highlights the importance of understanding the multiple dimensions influencing human–elephant interactions. It provides a broader understanding of the reasons behind these interactions and drivers of possible conflict scenarios in Lake Jipe area. This understanding will help inform better conservation decision-making and appropriate solutions that promote coexistence and tolerance.

We recommend immediate implementation of a concerted effort by the government and other stakeholders to revive the Lake Jipe fishery. A participatory management plan should be implemented and include: (a) a strategy to limit fish extraction from the lake, and stricter controls of small mesh fishing nets; and (b) the creation of no-take protected zones where fish can safely reproduce and fish stocks can recover. To avoid fishing-dependent households from being severely affected during these transitions and potentially turning to wildlife crime, temporary financial support or alternative income generating opportunities must be established.

The Ministry of Tourism and Wildlife has implemented recovery measures for the tourism industry during and post the COVID-19 pandemic to ensure the economic sustainability of the sector (Government of Kenya 2020). Some of the measures include offering tax reprieves for tourism industry actors, provision of financial stimulus to industry actors to support their operations, and an increasing focus on domestic tourism through a reduction in park fees. KWS and County Government could seize this opportunity to promote tourism around Lake Jipe and Tsavo West NP to improve the local economic benefits of tourism.

Measures to address the underlying social tensions between the Lake Jipe communities and Kenya Wildlife Service should encourage co-development of solutions that foster coexistence and reduce negative interactions with wildlife. Some of these tensions appear to be rooted in a misinterpretation of KWS policy and protocol. Solutions to reduce elephant movement into the community could include (a) repair of broken fences, (b) improving dry-season water access for elephants inside the National Park, and (c) curbing illegal livestock grazing inside the National Park. Combining these active elephant management initiatives with increased participation by community members in decision-making about fish stocks would give them positive control over key

issues impacting their daily lives. This could help reduce socioeconomic risk perception and thus increase tolerance towards elephants. Similarly, restoring trust in management authorities will influence levels of tolerance and, if sufficient, can encourage attitudes to slide along the continuum towards greater coexistence.

Acknowledgements

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