Local community benefits from elephants: Can willingness to support anti-poaching efforts be strengthened?

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Abstract

Poaching of Africa’s elephants has led to substantial population declines over the last decade. Local communities coexisting with elephants can play an important role in strengthening protection measures against poaching. Our paper empirically examined how the spread of costs and benefits associated with elephants, and associated ownership rights, influenced community attitudes to support anti-poaching activities. Based on surveys of 90 community members in the Zimbabwean part of the Kavango Zambezi Transfrontier Conservation Area, our results show that 92% of the respondents were unwilling to engage in conservation activities due to lack of financial gain from elephants. Local communities identified numerous benefits and costs associated with elephants. The majority (54%) of community members identified meat from the elephant as an essential benefit to their livelihoods. The most significant cost identified by the majority (60%) of respondents was crop destruction. The reported costs influenced villagers’ perceptions of elephants with 71% of respondents stating that continued incurred costs has reduced their willingness to participate in conservation activities. More so, the majority (88%) of respondents indicated that these costs have led to locals supporting actions to reduce elephant numbers. Furthermore, 82% of respondents indicated a lack of remorse when an elephant was killed after destroying their crops, and 95% of community members identified that feelings of bitterness toward elephants increased as they encountered costs. Our results suggest that gaining local support for elephant conservation to be more sustainable in low income regions, the overall benefits from elephants should outweigh the costs they impose.

KEYWORDS

African elephant, benefits, community-based conservation, costs, illegal wildlife trade, motivation, ownership rights, poaching
The escalating poaching of African elephants is one of the continent’s foremost conservation challenges (Wittemyer et al., 2014). Severe levels of poaching have been recorded in East, West, and Central Africa, whereas Southern African elephants have in recent years experienced increased poaching activities especially from organized crime syndicates (Lee et al., 2016; Wittemyer et al., 2014). Throughout the continent, there has been an increase in elephant poaching since 2007, with the highest peak recorded in 2011 (CITES, 2017; Great Elephant Census, 2016). A concerning trend has been the decline of elephant populations due to poaching in “hotspots” such as the Democratic Republic of the Congo, Gabon, Southern Tanzania, and Northern Zimbabwe (Lee et al., 2016). Furthermore, the Great Elephant Census produced in 2016 showed a 30% decline in the elephant population in the 15 of the 18 countries which were surveyed (Great Elephant Census, 2016). An enabling factor for the high levels of illegal wildlife trade is the increasing demand by the Asian market for ivory used as medicine, curios and luxury foods (Challender & MacMillan, 2014), consequently inflating ivory prices and incentivizing poachers (Lee et al., 2016). This is then exacerbated by high levels of poverty, corruption, and weak governance in source countries (Bennett, 2015; Hauenstein, Khatriya, Blanco, Dormann, & Beale, 2019). Therefore, to curb illegal wildlife trade, a plethora of conservation activities have been implemented which includes law enforcement, control of international trade and, to a lower extent, community engagement (Cooney, Roe, Dublin, & Booker, 2018).

Local communities are recognized as key actors in assisting and supporting efforts against poaching (Biggs et al., 2017; Cooney et al., 2017) aiming to increase resource-user participation. Due to their close proximity to wildlife, local rural communities are potentially essential agents of conservation as they can monitor and report any occurrences of poaching activities (Biggs et al., 2017; Cooney et al., 2017), while utilizing their comprehensive wildlife knowledge and skills to help reduce illegal wildlife trade (Cooney et al., 2018). Under this premise, a precondition for conservation success is strengthening the capacity of local rural communities and accommodating local interests and livelihood needs (Shackleton, Campbell, Wollenberg, & Edmunds, 2002). Decisions by local communities to engage in conservation are fundamentally influenced by benefits, costs, cultural, and historical factors (Biggs et al., 2017; Duncker & Gonçalves, 2017). Communities ought to procure substantial benefits from legal wildlife involvement in order to foster motivation to engage in conservation (Angula et al., 2018; Cooney et al., 2018).

According to the theory of reasoned action (Fishbein & Manfredo, 1992) and theory of planned behavior (Ajzen & Driver, 1992), human behavior is directed by attitudes, norms, and perceptions. This study focused in our research on the perceived benefits and costs of elephants, as these are what drive behavior and actions for or against poaching (Ajzen & Driver, 1992). When perceived benefits outweigh the perceived costs from conservation, the communities’ involvement in and their support of conservation reduces and this exacerbates negative attitudes toward wildlife (Adams, 2004; Cooney et al., 2018; Hazzah, Bath, Dolrenry, Dickman, & Frank, 2017). However, strengthening community engagement can also be achieved through granting local communities’ involvement in decision-making and development of wildlife policies (Cooney et al., 2018). Moreover, providing local communities with a voice and agency in the decisions concerning wildlife management in their region strengthens the sustainability of conservation and natural resource management (Biggs et al., 2019).

Living in close proximity to wildlife exposes locals to significant livelihood costs, creating antagonism between animals and humans (Dickman, 2010). Antagonistic behavior between animals and humans is a threat to conservation efforts (Biggs et al., 2017) and reduces support for conservation (Naughton-Treves, 2001). The ultimate drivers of this antagonistic behavior may be rooted in larger societal issues, such as poverty and inequality (Vedeld, Jumane, Wapalila, & Songorwa, 2012), and power imbalances and mal-governance processes (Lute, Carter, López-Bao, & Linnell, 2018). However, costs incurred by communities in close proximity to wildlife are the major influencers of negative perceptions of animals (Kansky & Knight, 2014). Negative perceptions can for example lead to retaliatory killing of wildlife in attempts to reduce wildlife impacts and associated costs (Kansky & Knight, 2014).

Recent publications have argued that the willingness of local communities to support efforts against poachers will depend on the balance between incentives (benefits and ownership rights) and costs they experience with living in close proximity to wildlife (Biggs et al., 2017; Cooney et al., 2017). In Zimbabwe, the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) was established to transfer the notion of ownership over wildlife to the communal people, thereby promoting community stewardship of wildlife through generation of economic benefits (Murombedzi, 1999). CAMPFIRE was established under the assumption that conservation and development goals can be achieved through the creation of strong collective tenure over wildlife resources in communal areas. Consequently, communal people such as those in Simangani village would
benefit through the distribution of revenues generated from wildlife resource utilization through the CAMPFIRE programme and incentivize them to support conservation efforts. However, there have been limited empirical studies on how the balance between perceived benefits and costs affects community willingness to support anti-poaching activities. We addressed this gap by investigating how the perceived spread of costs and benefits from wildlife affects community willingness to support anti-poaching efforts in Kavango Zambezi Transfrontier Conservation Area (KAZA), using a semistructured survey method.

2 | METHODS

2.1 | Study area

The study was conducted in Simangani village (Figure 1), approximately 130 km from Hwange National Park, in the Zimbabwean part of KAZA. This study area was selected due to its long history of experiencing human-wildlife conflict, particularly migratory elephants from the Hwange National Park, which has the largest free-ranging elephant population in Zimbabwe. Studies have revealed that some elephants of the Hwange National Park population undertake large-scale seasonal migration within KAZA in search of surface water (Teitelbaum et al., 2015; Tshipa et al., 2017). The presence of elephants in Simangani village and surrounding agricultural land was confirmed by key informant interviews from Hwange rural district prior to the commencement of the data collection. Local knowledge, sometimes supported by census data, is useful in providing information about some animal redistribution in the landscape especially in cases where movements are not obvious (Bruce, Albright, Sheehan, & Blewitt, 2014).

Similar to many rural communities, Simangani village is highly dependent on agriculture for livelihoods, with crop production being an important land use for many people in the village. The village falls under Zimbabwe’s agro-ecological region four which according to Vincent and Thomas (1960) has an average rainfall of between 450 and 650 mm, with hard red soils and scattered thorny bushes. Millet is mostly grown crop in this community and livestock production, that is, cattle, goats, is also a viable activity, although risky unless a villager can afford to buy stock-feed. Simangani with a total of 307 households, is especially active in the CAMPFIRE programme, with activities such as irrigation schemes, dip tanks and fishing cooperatives being common feature of the program (Hawkes, 1995).

FIGURE 1 Map showing the location of Simangani village and other villages around the Hwange National Park
Human and elephant interactions in the area have been affected by various legislative and governance structures, some dating back to the colonial era. For instance, the Land Apportionment Act of 1930 rescinded the land rights of rural people, consequently affecting their natural resources use and ownership rights (Pwiti & Ndoro, 1999). Independence policies, such as the Parks and Wildlife Act of 1982 which devolved management of wildlife to local communities, were implemented decades later. These provided avenues for the implementation of programs such as the CAMPFIRE, which facilitated communities to manage and benefit from wildlife surrounding their areas (Frost & Ivan Bond, 2008). The CAMPFIRE programme was still operational in the study area when this research was conducted. However, the program was affected by the land and agrarian reform of 2000 as certain areas, which were conservation sanctuaries were invaded by resettled farmers (Frost & Ivan Bond, 2008). Recently, the restriction of trophy hunting imports by the United States of America in 2014 (U.S. Congress, H.R.2245—CECIL Act, 2019; Lindsey, Balme, Funston, Henschel, & Hunter, 2016) adversely affected community conservation-based programs as the impoverished rural dwellers used to derive financial benefits from trophy hunting through employment, and enterprise opportunities for crafts and natural plant products (Stormer, Weaver, Stuart-Hill, Diggle, & Naidoo, 2019). Other studies have also provided evidence that supports the argument that restrictions in trophy hunting imports and trophy hunting bans, that is, in Botswana, will likely result in unintended negative consequences for conservation (Macdonald, Johnson, Loveridge, Burnham, & Dickman, 2016). Therefore, within the context of the above details, Simangani village provided an ideal study site as dwellers have personal and legislative experiences with elephants, which likely influenced their interactions with elephants.

2.2 Data collection

Individual household surveys were administered in the form of a semistructured questionnaire consisting of specific questions from which qualitative and quantitative data were extracted (Newing, 2010). The survey with selected households was carried out during the period of March 2018 to May 2018. Households were randomly selected using a freely downloadable Google Earth software, where random points were generated using the Cruise tool following Fries (2013) method. The Cruise function allows one to enter the number of points required, that is, 90 random points were generated for the village. These points were then displayed on a Google Earth map, printed out in color and taken to the field. During the survey, the household nearest to the Global Position System point was selected for the study and if not available or not willing to take part, the next closest willing household was used. Household heads were interviewed, and when the household head was not present, the most senior household member was interviewed and anonymity was guaranteed for all interviewees. The list of the households selected was further augmented by taking walks to cross check with the maps around the community as a form of ground-truthing before the research commenced. Ninety households were surveyed in a village of 307 households (Table 1); therefore, a sampling intensity of approximately 30% was achieved. The study also involved creating scenarios and presenting them to respondents in order to gain insight into the subject under investigation based on responses, interpretation, and predictions (Biggs et al., 2011; Biggs, du Toit, & Etienne, 2008; Sternam & Booth Sweeney, 2007).

To determine how costs influence people's engagement in anti-poaching initiatives and programs we provided participants with two scenarios. The first one was on community's attitudes and engagement in conservation after incurring continuous significant costs from elephants. The second scenario involved assessing community's engagement in conservation after subjection to the same scenario as the first; however, this time the community or household would be receiving significant benefits that positively improve the livelihoods. All questions were closed-ended, however, any further qualitative information the respondents provided were also recorded. This enabled collection

| Variable                        | Number (%) |
|---------------------------------|------------|
| Gender                          |            |
| Female                          | 46         |
| Male                            | 54         |
| Age                             |            |
| 18–35 years                     | 33         |
| 36–55 years                     | 47         |
| >56 years                       | 20         |
| Language                        |            |
| Nambya                          | 76         |
| Isindebele                      | 24         |
| Education level                 |            |
| Primary                         | 23         |
| Secondary                       | 67         |
| Tertiary                        | 10         |
| Employment status               |            |
| Formally unemployed             | 75         |
| Formally employed               | 25         |

TABLE 1 Prolife survey participants (n = 90)
of more contextual information to support the quantitative data. All interviews were done using the local languages which were Nambya and in some instances Isindebele were used. An interpreter conversant in English and the local languages was used to translate the interview questions. All variables were measured on a 5-point Likert scale (Likert, 1967). Two Likert scale responses were used and the responses to statements were either: 1 = strongly disagree, 2 = disagree, 3 = average/indifferent, 4 = agree and 5 = strongly agree, or: 1 = very insignificant; 2 = somewhat insignificant; 3 = partially significant; 4 = significant; 5 = very significant. The survey interviews were designed to obtain data on poaching intervention methods and community involvement; benefits from elephants on livelihoods, costs from elephants and how these benefits and costs influenced their engagement in conservation activities (Table 2).

2.3 Data analysis

Descriptive statistics were used to provide a summary of the responses from the questionnaire. Mann Whitney $U$ tests were used to compare the responses of participants about their engagement in conservation activities after two scenarios were provided to them: (a) incurring costs from elephants with no benefits and (b) incurring costs but also receiving significant benefits from elephants. Statistical analyses were conducted using Statistical Package for Social Sciences (SPSS version 25, Chicago, IL). The Mann Whitney $U$ test was selected because it is regarded as one of the most powerful non-parametric tests (Landers, 1981; Nachar, 2008), and is very useful in cases where the sample size is small and the data are semiquantitative (Nachar, 2008).

3 RESULTS

3.1 Intervention methods

The majority (88%) of the respondents agreed that there was an elephant poaching problem, they noted that poaching occurred around the surrounding communal lands where elephants were found. They noted that numerous intervention methods to curb poaching were

| TABLE 2 | Survey questions designed to measure intervention methods, benefits, ownership rules, and costs contribute to anti-poaching behavior |
|---------|----------------------------------------------------------------------------------------------------------------------------------|
| Questions/statements | Response |
| **Dependent variables** | |
| Intervention methods, for example, armed response | Indicate the extent to which you agree or disagree: |
| I am confident this intervention method is effective to control poaching. | 1 = Strongly disagree; 5 = strongly agree |
| Our household is actively involved in this intervention method. | 1 = Strongly disagree; 5 = strongly agree |
| This intervention method has reduced poaching. | 1 = Strongly disagree; 5 = strongly agree |
| Benefits | How significant are these benefits to your livelihoods? |
| Meat | 1 = very insignificant; 5 = very significant |
| Community tourism | 1 = very insignificant; 5 = very significant |
| Employment | 1 = very insignificant; 5 = very significant |
| **Explanatory variables** | |
| Ownership rules | The ownership rules allow equitable distribution of elephant benefits. |
| I feel we have fair ownership rights. | 1 = Strongly disagree; 5 = strongly agree |
| I value elephants more after being empowered and received benefits. | 1 = Strongly disagree; 5 = strongly agree |
| Costs | Indicate the level of significance: |
| Crop destruction | 1 = Very insignificant; 5 = very significant |
| Vegetation destruction | 1 = Very insignificant; 5 = very significant |
| Fence destruction | 1 = Very insignificant; 5 = very significant |
identified by respondents, as demonstrated by the following statement “Animals here, especially the elephants are poached a lot, the government and the council try to control poaching but it’s not enough.” These included armed response and law enforcement, enforced by Rural District Council (RDC) and Zimbabwe Parks Wildlife Management Authority; foot patrols and informants led by rural communities; and Education and awareness led by Zimbabwe Parks Wildlife Management Authority and NGOs. There was minimal involvement in these intervention methods by local communities (Table 3). Respondents strongly felt excluded from armed responses to poaching as well as education and awareness intervention methods. Community involvement in foot patrol and informant interventions was low mainly due to a lack of financial incentive to encourage the community to actively participate in these intervention methods as demonstrated by the following statement “We do not gain much from these species, we are not motivated to engage, we would rather do other activities which support or livelihoods.” The majority (50%, n = 45) of the respondents disagreed with the efficacy of armed response in controlling poaching, whereas (48%, n = 43) of the respondents were indifferent to its efficacy. Furthermore, (54%, n = 49) of the respondents disagreed and (40%, n = 36) were indifferent to the effectiveness of foot patrols in curbing poaching. They highlighted that intervention methods such as foot patrol and armed response were not well executed and poorly funded to significantly control poaching activities.

### Table 3  The extent to which households are involved in the available anti-poaching activities (%; n = 90)

| Response       | Armed response | Foot patrols | Informants | Education and awareness |
|----------------|----------------|--------------|------------|-------------------------|
| Strongly disagree | 54             | 2            | 3          | 20                      |
| Disagree       | 40             | 31           | 33         | 45                      |
| Average/indifferent | 3             | 53           | 42         | 32                      |
| Agree          | 1              | 14           | 22         | 3                       |
| Strongly agree | 2              | 0            | 0          | 0                       |


**FIGURE 2** Significance of the benefits, that is the degree of importance to the local rural people

#### 3.2 Benefits from elephants

African elephants provided a range of benefits of varying significance to the local communities (Figure 2). Meat from elephants was regarded by (54%, n = 49) of the respondents as a significant benefit to their livelihoods. The minority of the respondents (38%, n = 32) stated that the ornaments, which they made from elephant skin and
sold to tourists, were significant to their livelihoods. The respondents also noted that prior to the economic challenges which affected Zimbabwe, employment opportunities in the safaris for the local people were high and this provided a livelihood to community people. However, the majority of the respondents (88%) bemoaned that the economic problems within the country has resulted in the Zimbabwe Parks and Wildlife Management Authority, RDC and Safari’s capacity to employ local people being curtailed with only a few members of the community still receiving employment on a contractual basis. Respondents noted benefits from community tourism and trophy hunting had curtailed drastically from 2015, as evidenced by (50%, n = 45) of the respondents who noted that it was insignificant and (44%, n = 40) of the respondents stated that it was very insignificant to their livelihoods. However, respondents noted that the benefits were not being distributed equally (Table 4). Respondents noted that they lacked resources to fully implement profitable community tourism. The majority of the respondents (94%, n = 85) also stated that communities were permitted to take their animals for grazing within the park. The legalities of this activity were not questioned as it was beyond the scope of the survey; however, this grazing activity significantly contributes to the livelihoods of local communities.

### 3.3 Costs from elephants

Specifically, for this study, costs were defined as losses which the communities endured due to human–elephant interactions present in their communities. The presence of elephants in the area negatively impacted the community’s land use and often caused them to incur costs of varying significance (Figure 3). Local communities identified costs from elephants as any negative impact inflicted on their livelihoods due to elephant’s actions. These costs included crop loss, human injury, and fence, vegetation, and infrastructure destruction.

| Response | Meat | Community tourism | Employment | Infrastructure | Community ownership | Trophy hunting |
|----------|------|-------------------|------------|----------------|---------------------|---------------|
| Strongly disagree | 46 | 55 | 63 | 58 | 60 | 50 |
| Disagree | 37 | 40 | 30 | 35 | 33 | 38 |
| Average/indifferent | 10 | 3 | 5 | 4 | 2 | 5 |
| Agree | 4 | 2 | 2 | 2 | 3 | 4 |
| Strongly disagree | 3 | 0 | 0 | 1 | 2 | 3 |

**TABLE 4** The extent to which households agree with equity in benefit distribution (%; n = 90)

**FIGURE 3** Significance of the costs, that is, the degree of importance of the costs incurred
Given that local community's livelihoods are mostly agro-based, destruction of crops posed a major threat to their livelihood. The respondents noted that crop, fence, and vegetation destruction were the frequently experienced costs (more than once a month). Crop destruction was more frequent during the peak of the farming season, that is, toward harvesting, as highlighted by 62% ($n = 56$) of the respondents.

### 3.4 Scenarios of experiencing costs and benefits and attitudes toward elephants

#### 3.4.1 Scenario 1: Incurring only costs from elephants

Responding to the scenario concerning how incurring costs only from elephants without benefits would influence people's engagement in anti-poaching initiatives and programs. The majority (97%, $n = 87$) of the respondents either strongly agreed or agreed that their affinity for elephants would decrease if only costs were incurred. Local communities anticipated that antagonism between elephants and humans would increase and some of the respondents noted that they would not only be involved in movements to reduce the population of elephants but they would also initiate these movements, under this scenario. The minority of the respondents (30%, $n = 27$) noted that they would rather convert the land inhabited by elephants to agricultural land or other livelihood enhancing activities. Despite incurring costs from elephants, (15%, $n = 14$) of the respondents mentioned that they would still report the presence of poachers within their areas as indicated by this quote from one respondent, “It is my duty to protect the environment.”

#### 3.4.2 Scenario 2: Incurring costs from elephants while receiving significant livelihood benefits

In the scenario where the local community incurs significant costs as well as receiving significant livelihood benefits from elephants, respondents expressed a change in attitude toward elephants. When compared to the responses from presenting Scenario 1 (i.e., only incurring significant costs from elephants without receiving benefits), a Mann Whitney ($U$ test) indicated benefits significantly influenced local community's engagement and perceptions to anti-poaching activities despite the costs (Table 5). For instance, 88% ($n = 79$) of the respondents either agreed or strongly agreed that they were likely to support community interventions to reduce elephant populations when only incurring costs, in comparison to only 20% ($n = 18$) of the respondents agreeing to being involved in such movements if they were also receiving significant livelihoods benefits from elephants. Moreover, 87% ($n = 78$) of the respondents either agreed or strongly

| Statement                                                                 | Prebenefits ($n = 90$) | Postbenefits ($n = 90$) | Mann Whitney $U$ | Significance (two-tailed) |
|---------------------------------------------------------------------------|------------------------|-------------------------|------------------|---------------------------|
| My affinity for elephants around our area will decrease.                   | 4.5                    | 3                       | 363.50           | $p = .002$                |
| My willingness to support anti-poaching activities will reduce.           | 4.3                    | 2.8                     | 705              | $p = .003$                |
| I will be less likely to report the presence of potential elephant poachers.| 3.0                    | 1.9                     | 1,400            | $p = .004$                |
| I will more likely support a community movement to reduce elephant populations in our area. | 4.3                    | 3.0                     | 858              | $p = .07$                 |
| I will not feel remorse when an elephant is killed after destroying my crops. | 3.3                    | 2.4                     | 1,788.5          | $p = .002$                |
| I will expect that protection barriers against elephants should be strengthened. | 4.5                    | 3.5                     | 1,187.00         | $p = .032$                |
| My bitterness toward elephants increases as I encounter costs.            | 4.5                    | 3.4                     | 1,170            | $p = .021$                |

$*p < .05.$
agreed that they would be less willing to support anti-poaching activities when only incurring costs, compared to 12% \( (n = 11) \) of the respondents agreeing that they would be less willing to support poaching if they also received significant livelihood benefits from elephants.

### 3.5 Ownership rights of elephants by local communities

The local community felt they were excluded from elephant ownership and decision-making with 97% \( (n = 87) \) of the respondents noting that they did not have any ownership rights. One common statement emerging from the majority of the respondents \( (63\%, n = 57) \) was: “We do not own anything, but the RDC and Zimbabwe Parks and Wildlife Management Authority do.” All the respondents \( 100\% \ (n = 90) \) indicated that the RDC and Zimbabwe Parks and Wildlife Management Authority department were the two authorities responsible for granting quotas through which the local people could access their benefits from wildlife. Also, all the respondents \( 100\% \ (n = 90) \) were in strong disagreement with the ownership rules and rights currently in operation. These ownership rights were regarded as unfair to the community, with 50\% \( (n = 45) \) of the respondents disagreeing and 48\% \( (n = 43) \) of the respondents strongly disagreeing that the ownership rights were fair to them. In fact, they did not understand the ownership rights or the channel in which the benefits are distributed as demonstrated by the following statement from one of the respondents: “We just wait for notification from authorities to come and get benefits.”

With regard to effectiveness of the current ownership rights, 53\% \( (n = 48) \) of the respondents disagreed and 18\% \( (n = 16) \) of the respondents strongly disagreed that current ownership rights were effective in controlling the overexploitation of elephants. Furthermore, 96\% \( (n = 86) \) of the respondents felt that the local communities were considered unimportant in regard to the implementation and enforcement of the ownership rules. The respondents felt that the RDC was the most influential actor in wildlife management, followed by the Zimbabwe Parks and Wildlife Management Authority, community leaders, the community wildlife committee and lastly the local community members.

The majority of the respondents \( 83\%, n = 75 \) either agreed or strongly agreed that their attitude toward elephants would change after receiving enhanced ownership rights. Respondents identified adequate ownership rights as having a voice in the creation or enforcement of new laws, being consulted by authorities in decision-making and improved benefits from wildlife. The majority \( 89\%, n = 80 \) of the respondents agreed that they would value elephants more after receiving adequate ownership rights. Furthermore, 51\% \( n = 46 \) of the respondents agreed and 20\% \( n = 18 \) of the respondents strongly agreed that their incentive to be involved in poaching activities would decrease after getting ownership rights.

### 4 DISCUSSION

Although the importance of including local communities in conservation activities has been highlighted (Biggs et al., 2017; Cooney et al., 2017), to our knowledge this is one of the first empirical studies that assess how the balance between the costs and benefits from elephants affect community’s willingness to support anti-poaching activities using scenarios. Our study demonstrates the importance of the benefits and costs experienced by communities in their willingness to support conservation as discussed by Biggs et al., 2017 and Cooney et al., 2017. Moreover, our study points out the importance of providing communities with ownership rights.

#### 4.1 The consequences of costs from coexisting with elephants

Our results support insights that living in close proximity to elephants expose local communities to significant costs, such as damage to or loss of crops and livestock and occasionally human injury or death (Gibson & Marks, 1995). Elephants are reported to be responsible for up to 75% of all wildlife-related crop damage in communal areas, with cases predicted to increase as the elephant population continues to grow (Agere, 2015). In our study, crop destruction was the most significant cost mentioned and considering that agriculture is one of the most important livelihood activities (Masunungure & Shackleton, 2018), crop destruction exacerbated the community's already high vulnerability. Crop destruction increased in frequency and severity toward the harvesting season and significantly reduced crop yield. To deter elephants, local rural people have developed response mechanisms such as drum beating, fire, and creation of scarecrows. Elephants also frequently destroyed fences forcing local communities to frequently replace them often with substandard self-procured poles which are not strong thus compromising their safety. In addition, elephants were also constantly destroying surrounding vegetation which provides an important livelihood resource. The majority of the 9.2 million rural dwellers of the Savanna are dependent on natural resources for their livelihood through provisioning resources such as energy,
food, medicine, shelter, and as a safety net (Shackleton & Shackleton, 2004). Local community’s houses and properties were also destroyed by elephants, and given that local communities already are economically marginalized this destruction further worsened their situation. Elephants were also a threat to human life with a few casualties and injuries being recorded over the years.

Communities that frequently experience these costs from wildlife often develop negative perceptions of wildlife and this consequently derails conservation efforts (Biggs et al., 2017; Cooney et al., 2017). Similar to Hazzah et al. (2017), attitudes may be used to predict behavior in situations where the local communities have strong knowledge about the value of the species of interest. Costs experienced by communities in close proximity to wildlife are the major influencers of their perceptions of wildlife (Kansky & Knight, 2014).

### 4.2 The importance of benefits

Our study shows that the dearth of significant financial benefits from elephant conservation activities demotivates the local community to engage in conservation activities. Members of the local community experienced both benefits and costs from elephants (Figures 2 and 3), which ultimately influenced their willingness to engage in conservation activities. Our study demonstrates that in order to achieve sustainable conservation engagement by local communities, combined benefits from wildlife should outweigh the costs incurred.

The northern part of Zimbabwe where the Hwange National Park is situated is an elephant “hotspot” which has been encountering escalating levels of poaching (Lee et al., 2016). Interestingly, the rural dwellers expressed knowledge of elephant poaching and areas prone to poaching. Such knowledge of wildlife poaching, perpetrators and the manner of poaching by the community mirrors findings by Duncker and Gonçalves (2017) in KwaZulu Natal, South Africa. This highlights that communities living within the vicinities of high-value wildlife species like elephants, offer the best chance of conserving them (Challender & MacMillan, 2014). To curb poaching, several intervention methods have been implemented. However, our results show that there has been minimal involvement by the local community in such activities due to a lack of financial incentives for them. Our results support the importance of providing incentives that meet local’s livelihood expectations and these can take many forms such as disposable income, local empowerment, secure land tenure, and better access to health and educational facilities (Challender & MacMillan, 2014; Harihar, Ghosh-Harihar, & MacMillan, 2014).

Local communities gained an array of benefits from elephants such as meat, skin, medicines, employment, infrastructure development, community tourism, and ornaments. Meat from elephants was identified as the most valued product to their livelihoods. Meat from elephants is either given to communities for free or is sold for low prices such as $2 per kilogram compared to the butchery prices of $7 per kilogram resulting in significant cash saving. Even though employment by National Parks and Safaris has curtailed, some of the locals gained employment from the Safaris, Zimbabwe Parks and Wildlife Management Authority Parks and RDC. Employed community members serve as the breadwinners in their respective households. In a country facing the serious challenge of high unemployment rates in the post-independence era (Mujeyi & Sadomba, 2019), any form of employment will become significant for peoples’ livelihoods. Like in many other CAMPFIRE areas, some of the proceeds are used to pay for underprivileged children’s school fees (Muyengwa & Child, 2017).

### 4.3 Inequality and other challenges

Communities expressed concern over the equity of distribution of the benefits (Table 4). The unequal spread of benefits from wildlife can threaten conservation efforts (Biggs et al., 2017). Unequal distribution of CAMPFIRE benefits due to elitism in Masoka, Zimbabwe created rifts within the community which derailed its success (Muyengwa & Child, 2017). More often, elite capture excludes communities from decision-making process. For instance, communities in Masoka noted that they were only notified of how the funds had been used, extremely excluded from budgeting process (Muyengwa & Child, 2017). Moreover, the findings from Masoka show that political and traditional leaders felt superior over local communities and made the CAMPFIRE their own personal project and they overruled any decision made by the local communities (Dube, 2019; Muyengwa & Child, 2017). Moreover, local communities felt disempowered to challenge traditional leaders as they threatened to evict them from land (Muyengwa & Child, 2017). Consequently, in such situations local communities are not motivated to engage in wildlife conservation programs.

A key avenue for financial benefits from elephants in CAMPFIRE is the trophy hunting of elephants (Dube, 2019). However, trophy hunting of elephants in Zimbabwe was negatively affected by the U.S. restrictions on trophy hunting imports from Zimbabwe (U.S. Congress, H.R.2245—CECIL Act, 2019; Dube, 2019). Although elephants are not the only species that provide
benefits to communities, elephants are the main source of revenue from CAMPFIRE (Dube, 2019; Muyengwa & Child, 2017). Our findings echo the results from other studies in Zimbabwe on the importance of benefits from wildlife. For example, Gandiwa, Heitkönig, Lokhorst, Prins, and Leeuwis (2013) found that local communities bordering Gonarezhou National Park perceived a higher level of benefits from CAMPFIRE through tourism, meat, and infrastructure development. Moreover, the local communities noted continued experiencing of livelihood losses from animals was prompting retaliatory actions against the animals (Gandiwa et al., 2013).

4.4 The role of ownership

Lack of ownership rights and low prioritization of local communities in wildlife management has deterred community involvement in conservation. This mirrors findings from South Africa where rhino poaching increased after the new legislation in 2008 diminished ownership rights of locals consequently reducing their incentives to engage in conservation (’t Sas-Rolfes, Moyle, & Stiles, 2015). Further, Muyengwa and Child (2017) argue that CAMPFIRE communities lack effective ownership rights, consequently this has incapacitated them to deal effectively with corruption and poaching. In Zimbabwe, traditional leaders are more influential in wildlife decision-making compared to local communities because of their control of communal lands (Muyengwa & Child, 2017). These findings were also corroborated by Blackie and Sowa (2019) who also found that when local communities are denied access to wildlife as a resource for utilization, they no longer associate themselves with the wildlife, especially elephants which cause severe damages to their livelihoods. Perceptions of local communities toward wildlife are positively influenced if they are active participants in management decision-making (Biggs et al., 2019; Cox, Arnold, & Tomás, 2010; Duncker & Gonçalves, 2017).

Providing local communities with ownership rights goes beyond motivating them to engage in wildlife management but also gives them a sense of worth and pride. Local communities have long been known to use their skills and knowledge to assist strangers in their poaching, receiving income and other material benefits (Gibson & Marks, 1995). Consequently, inclusionary wildlife policies providing local communities with ownership rights induces local communities away from past practices, particularly poaching, and toward behaviors which conserve wildlife (Child, 2019). Some of the conservation conflicts involve deep-rooted conflicts and often arise from unaddressed social and psychological issues which include status, recognition, dignity, acknowledgment, and power imbalances (Madden & McQuinn, 2014). This suggests the importance of devolving wildlife management structures to locals for maximum engagement (Cooney et al., 2018), that transforms the “would-be” poacher into an individual with a sense of proprietorship over wildlife (Child, 2019).

5 LIMITATIONS OF THE STUDY

Our exploratory study evaluated perceptions and stated support for conservation activities and we did not measure revealed behavior. Other studies have demonstrated that revealed behavior may differ from what is stated especially for illicit activities such as poaching (Hazzah et al., 2017; Van Velden et al., 2020). Future studies can expand on our research through the use of methods for measuring illicit behavior such as the unmatched count technique (UCT) (Hinsley, Keane, St. John, Ibbett, & Nuno, 2019). With UCT, for example, the respondents are asked directly about their own sensitive behavior at the same time as they are asked about a number of neutral or socially desirable behaviors (Coutts & Jann, 2011). Consequently, this technique allows for the estimation of the prevalence of sensitive behavior from an estimate of the prevalence of other behaviors (Hinsley et al., 2019).

6 CONCLUSION

The improvement in conservation of cornerstone wildlife populations can be achieved by expanding our understanding and influences on human behavior (Manfredo & Dayer, 2004). This paper empirically shows that the distribution of costs and benefits associated with elephants, and associated ownership rights, can influence community attitudes to support anti-poaching activities within their local community. Our results emphasize the urgency of strengthening tangible benefits from elephants and other wildlife and improved ownership rights for local communities that coexist with wildlife.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS
Agripa Ngorima: Responsible for developing scope of the project, developed questionnaires, collected data, analysis of results, wrote the drafts of the papers with the help of the co-authors. Abigail Brown: Drafting and editing of the manuscript. Current Masunungure: Drafting of the manuscript, analysis of results, and editing of the manuscript. Duan Biggs: Assisted with developing the scope of the project, reviewed all the drafts and provided insightful knowledge on the manuscript, and edited the manuscript.

DATA AVAILABILITY STATEMENT
The data used in this study are readily available upon request.

ETHICS STATEMENT
The study was conducted with integrity and honesty. All protocols were observed and before commencement of the research, permission was sought from the relevant authorities with field work only commenced after permission was granted. In addition, during the interviews, household heads were interviewed with their verbal/written consent, and when the household head was not present, the most senior household member was interviewed. Anonymity was guaranteed for all interviewees who participated in this study.

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