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"Milking the lions": An analysis of conservation performance payments in eastern and southern Africa

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Abstract

Conservation performance payments (CPPs) aim to encourage coexistence between humans and large carnivores by tying payments to species presence or abundance. While there is growing interest in the development of these programs, they remain the subject of little empirical research. Furthermore, there is no literature on CPPs for carnivores in Africa, despite the continent's global importance in carnivore conservation and the fact that multiple such schemes are currently in operation. This research establishes where and how these schemes function and identifies recurring challenges associated with their implementation. We conducted semi-structured interviews with representatives of nine conservation performance payment programs operating across five countries in eastern and southern Africa. We find that despite their theoretical simplicity, local complexities, and pragmatism mean there is significant variation in how CPPs operate. This includes differences in monitoring methods, governance, and all aspects of payments. The inclusion of input conditionality (i.e., fines or bonuses for certain actions) in a majority of schemes also challenges the prevailing conceptualization of CPPs as entirely results-based. Recurring challenges include securing long-term funding, setting suitable payment levels, and ensuring equitable governance. Practitioners view performance payments as a promising approach for carnivore conservation, but their roll-out risks moving faster than our understanding of them.

KEYWORDS
carnivores, compensation, conservation, equity, payments for ecosystem services, payments to encourage coexistence, performance payments, results-based payments

1 | INTRODUCTION

Large carnivores have undergone a dramatic global decline in population size and range (Ripple et al., 2014; Wolf & Ripple, 2018). This is partly due to competition over access to space and resources between them and the human populations they live among (Inskip & Zimmermann, 2009; Nelson, 2009). This competition imposes a variety of negative impacts on people, which in many contexts incentivizes the persecution and killing of

large carnivores (Dickman et al., 2011; Inskip & Zimmermann, 2009; Nelson, 2009; Zabel & Holm-Müller, 2008). Conservationists have tried to address this with economic incentives such as compensation, insurance, and performance payments (Dickman et al., 2011).

Conservation performance payments (CPPs) are a relatively novel type of payment for ecosystem service, where payments are tied to the presence or abundance of species (Zabel & Roe, 2009). This results-based approach is thought to make them more cost-effective than less direct payments (Drechsler, 2017; Ferraro, 2001; Ferraro & Kiss, 2002; Ferraro & Simpson, 2002), and has seen them implemented for a wide variety of species, including plants, butterflies, turtles, and farmland birds (Ferraro & Gjertsen, 2009; Herzon et al., 2018). CPPs are of particular interest for carnivore conservation because, unlike compensation and insurance—which relate only to dead livestock—performance payments can directly incentivize coexistence with living carnivores (Dickman et al., 2011).

The current literature on performance payments for carnivore conservation mainly consists of research on the economic theory underpinning their mechanism (Drechsler, 2017; Heydinger et al., 2022; Zabel & Holm-Müller, 2008; Zabel & Roe, 2009) and broader theoretical discussions of their potential and challenges (Dickman et al., 2011; Hamm et al., 2024; Nelson, 2009). To our knowledge, only five such schemes appear in the peer-reviewed literature, and while there exists a number of individual case studies (e.g., Chen et al., 2022; Eshoo et al., 2018; Harvey et al., 2017; Hiedanpää & Borgström, 2014; Persson et al., 2015), no previous work has comparatively analyzed the choices and challenges facing CPP operators.

Here, we address this knowledge gap, using case studies from across eastern and southern Africa. We focus on these regions because, while they have largely succeeded in maintaining populations of large carnivores, they have significant human–carnivore conflict and ongoing species declines (Bauer et al., 2015; Di Marco et al., 2014; Gebo et al., 2022; Gray et al., 2020; Lyamuya et al., 2014; Ripple et al., 2014). Furthermore, multiple CPPs for carnivores are currently in operation in these regions but remain absent from the peer-reviewed literature. We contribute to the scholarship by answering the following research questions: how do these schemes operate, how does this compare with prior theoretical assumptions, and what challenges do they face?

2 | METHODS

We interviewed 12 individuals, representing nine CPPs across five eastern and southern African countries. We used a purposive "snowball sampling" approach to identify interviewees. Some individuals were initially identified as possible participants through social media and non-governmental organisation (NGO) reports that indicated that their organizations were involved in a CPP. These individuals were then asked to recommend potential others. This approach can produce a non-representative sample, as interviewees may select others who share perceptions on the topic of interest (Salganik & Heckathorn, 2004), but it is an effective way to access a small population and explore a topic in depth (Newing, 2011; Parker et al., 2019; Rust et al., 2017).

Two interviewees described their roles as primarily research-focused, and another as a development economist and community elder. The remainder were program directors or project coordinators of their organizations' broader conservation work. Exploring these professionals' insights and perspectives is critical because they are the people who are interpreting, shaping, and implementing a novel conservation tool in response to on-the-ground needs, in the absence of a relevant body of literature (Martin-Ortega & Waylen, 2018).

Semi-structured interviews were conducted with between one and three people per scheme, as the CPPs were typically overseen by just one or two staff members within the organizations' broader structure. Schemes were represented by more than one interviewee only when it was convenient, relevant, and when the individuals performed different roles regarding the scheme. Two CPPs were represented by the same two individuals, as the schemes are operated in the same place and by the same organization. Interviews were conducted online or by telephone, with the exception of one scheme, which was conducted in person as part of a separate and in-depth case study. Each participant was interviewed once, for approximately 1 h, between June and November 2023. We do not link interviewees' roles with specific schemes, countries, or regions in order to maintain their anonymity as per the informed consent agreement.

We took an explorative approach to interviews in order to identify those issues believed by participants to be important, without dictating any prior frame of analysis (Mabon et al., 2021). These perspectives were subsequently used to adapt data collection in a dynamic process that guided subsequent interviews (Pettersson et al., 2021; Rust et al., 2017). The exact questions asked of each interviewee, therefore, varied, but all were asked to explain the decisions underpinning scheme design, as well as questions relating to funding, equity, theories of change, challenges, successes, and context-specific issues (see Supporting Information S1).

This approach meant that we could interweave our findings into existing conceptual research (Mabon

et al., 2021; Strauss & Corbin, 1994), particularly relating to the design (Dickman et al., 2011; Nelson, 2009; Zabel & Engel, 2010; Zabel & Roe, 2009) and broader socio-political contextualization of CPPs (Hiedanpää & Borgström, 2014; Sjoegren & Matsuda, 2016; Åhman et al., 2022; Hamm et al., 2024). A potential drawback with this approach is that important themes may only be incorporated later in the data collection process (Potgieter et al., 2017); no such pattern was observed here. Data were analyzed thematically in the qualitative analysis software NVivo 12 (QSR International UK Ltd.), with an initial coding structure comprising three categories relating to the implementation of CPPs, namely: scheme design, governance, and challenges (Attride-Stirling, 2001). These organizing themes were added to and populated with data-derived re-occurring basic themes, iteratively revised to produce a logical narrative that reflected interviewees' responses and the process of CPP development (Attride-Stirling, 2001; Mabon et al., 2021; Pettersson et al., 2021, 2022).

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3 | RESULTS

Before the results of the thematic analysis, we provide a brief overview of the schemes.

3.1 | Overview

The interviews revealed that three of the nine CPPs represented were trials that had concluded between 2020 and 2023. The other six began between 2015 and 2023. All are operated by NGOs, with a single NGO operating four. In all cases, the CPP is not used as a standalone tool, but rather as one component of broader attempts to encourage coexistence between people and wildlife. All but three schemes are at least partly funded by the Lion Recovery Fund, a grant-making body managed by the Wildlife Conservation Network, a US-based NGO.

Five schemes operate in areas with some degree of protection for wildlife (i.e., game management area, conservation area, reserve, wildlife management area, or community conservancy), and three are adjacent to such areas (including private game ranches). The carnivore guild is largely consistent, with lion *Panthera leo*, leopard *Panthera pardus*, spotted hyena *Crocuta crocuta*, and wild dog *Lycaon pictus* all present (although rare in some). Striped hyena *Hyaena hyaena* are present in four, and cheetah *Acinonyx jubatus* in five—although typically in low numbers. Only one scheme pays for a single species (lion), with the rest paying for most or all of the large carnivore species present.

Interviewees overwhelmingly perceived their respective CPP as achieving greater behavioral tolerance of large carnivores, but there has been no robust evaluation in any of them. Knowledge sharing between schemes is limited, with one interviewee noting "we're all so isolated ... I wish there was more sharing between projects about what we're learning."

A recurring theme was that of the threats facing large carnivores, with interviewees identifying multiple. Snaring was repeatedly implicated, although mostly as unintentional bycatch in snares set for subsistence hunting, targeting ungulates like impala *Aepyceros melampus* and bushbuck *Tragelaphus scriptus*. Deliberate spearing or poisoning (where a carcass is laced with a highly toxic pesticide such as carbofuran) were also identified as serious threats. Such actions were perceived as typically being done in response to, or as an attempt to prevent, livestock depredation. While poisoning events were considered infrequent, their impact is disproportionately large due to the potency of the chemicals and their indiscriminate effects (Dunford, 2022; Masenga et al., 2013). Land-use changes, livestock encroachment, and direct killing for the illegal trade of body parts (e.g., lion teeth and claws) were also considered threats, but by fewer interviewees. Traditional killings, where carnivores are killed as a "symbol of strength and power of a young warrior" were not considered a current threat, but had been an issue in three schemes in recent years.

3.2 | Scheme design

3.2.1 | Payment systems

Three different payment systems are used by these CPPs. Four use a continuous system, whereby the recorded presence of a target carnivore is worth a specific, pre-agreed amount of money. Those schemes which pay for multiple species in this manner equate their different "values" using points-based systems, where points equate to a monetary value. The number of points assigned varies across species and schemes, with large carnivores tending to score highest. Many interviewees noted the difficulty of assigning a suitable value to species, with

one noting: "we had wild dogs come through, and we were not expecting that ... the corresponding amount skyrocketed and we didn't have enough funds to cover that."

Two schemes use a relative payment system, whereby participating units compete against one another and receive payments based on relative performance. Interviewees considered this to provide an element of budgetary stability, as the total payment amounts remain constant each cycle. Another scheme alternated between a continuous and relative payment system during different phases of the trial. The remaining two schemes use threshold payment systems, where payments are set at staggered levels. Both relative and threshold payment systems also assign point "values" to species in order to gauge overall performance, but use these points as units of comparison (to other participating units or specific benchmarks) and not as monetary equivalents.

3.2.2 | Payment amounts

Species are valued differently across schemes. For example, the presence of a lion was worth just as much as the presence of a wild dog in one country, but twice as much in another, and 25% less than one in a third. There were also differences in absolute valuation. For example, a lion was valued at ~USD 25, ~USD 60, and ~USD 180 in three different countries. Interviewees justified the relative and absolute valuation of species with reference to their local and global abundance (with higher value assigned to endangered and/or locally rare species), propensity to kill livestock (particularly cattle), and likelihood to defend such kills (rather than be pushed off, so that any remaining meat can be harvested).

These varying payment amounts mean that the CPPs are framed differently. For instance, in one scheme, the payments are "not really to offset the costs" but "to acknowledge the costs of coexistence." Similarly, in another, the goal is not "to match up the value of a goat [lost to a carnivore]," but to "give them some incentive not to reach for the gun straight off." In another, the payments are "nothing" compared to the economic costs imposed by carnivores. In contrast, the payments disbursed by one scheme were considered by all three interviewees to be greater than the cost of livestock lost to lions (the only species paid for). One interviewee, a Maasai elder involved in implementing the scheme, described how "the people are speaking about milking the lions. They are our cows, they are our milking cows because we are getting benefits from them ... we cannot kill a cow that gives us milk." The payment (~USD 180 per lion, per month) aimed to offset the cost of livestock killed, but was considered an overestimate by the three

interviewees, as it had been based on predation data from a lone male lion, and "if you have a group [of lions] ... they're not going to take a cow each," so the actual cost per lion was considered to be less. While unintentional, this perceived discrepancy was viewed positively, with interviewees noting that it helped to address the indirect costs of large carnivores, such as time spent protecting livestock.

This was the only scheme considered to more than offset the cost of livestock lost to the relevant carnivore species, with multiple interviewees noting that setting higher payment amounts was unfeasible due to the difficulty of obtaining and synchronizing short-term grants across funding cycles. Two schemes even started without sufficient funding in place. Across all schemes, the total amounts of money disbursed, and their regularity, varies widely (see Table 1).

3.2.3 | Monitoring of carnivores

There is further variation in how the focal species are monitored. Camera traps are the most common tool, with six schemes using them in isolation and another in conjunction with telemetry data. Additionally, one scheme alternated between using camera traps and sand pits (for spoor). Most schemes allow participants to move the cameras at specified intervals, but one fixes them permanently in place. This means that the data can also be used for long-term ecological monitoring, but it does reduce participants' ability to maximize carnivore encounters across seasons.

The images collected by camera traps are utilized differently. For example, one scheme pays only once per species, per day (e.g., a single elephant *Loxodonta africana* seen once and an entire herd seen twice are equivalent). Another scheme in the same country will only pay once per day if it is "clearly the same individual," but does pay for multiple individuals of the same species in the same day. Others differ in how they define independent events. One scheme has no cut-off period and simply pays per picture. In contrast, another did not want to pay "for 50 pictures of the same leopard," but would pay again "if you could show that it was a separate [individual] coming through." Four other schemes use cut-off periods ranging from 15 to 30 min.

One scheme targets lions alone, and is the only one that does not use camera traps. Instead, lion occurrence is determined by spoor presence, complemented by telemetry data and playbacks (where animal noises are played through a speaker in order to attract individuals). One interviewee described "a lot of weaknesses" in this monitoring approach. These include being unable to

TABLE 1 The conservation performance payments of eastern and southern Africa vary widely in their operation.

Scheme	Country	Number of interviewees	Payment system	Payment amount	Payment frequency and recipient	Monitoring	Input conditionality	Years
A	1	3	Continuous	~USD 180 per lion, per month. Capped at ~USD 10,800 per ward, per year	Every 4 months, to wards (2 in total, formed of 3 villages each)	Spoor presence, playbacks, and telemetry data	Fines	2020–2023
B	1	2	Relative	Certain species are allocated specific "points." Payments from ~USD 400–1600	Every 3 months, to villages (11 in total, in groups of 3 or 4)	Camera traps	None	2015–present
C	1		Threshold	A base payment of ~USD 500. The performance element is tied to "points" and set to thresholds, which differs across the two sites but range from ~USD 60–400. Overall payments are capped at minimum (~USD 100) and maximum (~USD 1000) amounts, regardless of additional inputs	Site 1: every 3 months, to villages (2 in total). Site 2: every 2/3 months to villages (3 in total)	Camera traps, telemetry data, and spoor presence	Fines and bonuses	Site 1: 2021–present Site 2: 2022–present
D	2	1	Threshold	A base payment of ~USD 200. The performance element is tied to "points" and set to thresholds (~USD 410, 510, and 680). Overall payments are capped at minimum (~USD 68) and maximum (~USD 880) amounts, regardless of additional inputs	Every 3 months, to villages (5 in total)	Camera traps	Fines and bonuses	2022–present
E	2	1	Continuous	A base payment of ~USD 920. The performance element consists of allocating certain species "points," which have an equivalent monetary value. Overall payments are capped at minimum (~USD 200) and	Every 2 months, shared between 12 villages	Camera traps	Fines	2023–present

(Continues)

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TABLE 1 (Continued)

Scheme	Country	Number of interviewees	Payment system	Payment amount	Payment frequency and recipient	Monitoring	Input conditionality	Years
				maximum (∼USD 2700) amounts, regardless of additional inputs				
F	3	2	Relative	Varied across different phases, but finished with payments ranging from ∼USD 100–200	Every 1–3 months, to up to 8 villages	Alternated between spoor presence and camera traps	None	2020–2021
G	3	1	Alternated between continuous and relative	Varied, but ranged from ∼USD 540–770 per village per cycle	Every 3 months, to villages (2 in total)	Camera traps	Fines	2020–2021
H	4	1	Continuous	∼USD 25 for lion, leopard, and spotted hyena, ∼USD 13 for wild dogs. Various payments for ungulates. Capped at ∼USD 5650 per village per year.	Every 3 months, to villages (10 in total)	Camera traps	Bonuses	2021–present
I	5	1	Continuous	∼USD 60 for lion, ∼USD 30 for wild dog and cheetah, ∼USD 6 for leopard	Monthly, to individuals (17 in total)	Camera traps	None	2021–present

Note: "village" should be considered to mean different things (e.g., a small collection of households, up to a large settlement of multiple sub-villages).

account for variation in spoor presence and persistence across different substrates, and difficulties in determining the number of individuals: "it relies a lot on my judgement ... females and the juvenile lions can be near impossible to distinguish." When there is doubt over the number of individuals, they "don't pay for the extra lion."

There was agreement that using spoor requires significant survey effort, as information is readily lost to rain and other disturbances, whereas camera traps can be left in situ for extended periods. While the use of telemetry data can help to guide more accurate and equitable payments (Hamm et al., 2024; Heydinger et al., 2022), the money, expertise, and bureaucratic engagement required made it unfeasible for most schemes.

3.2.4 | Input conditionality

While CPPs are typically considered to be based on outcomes (i.e., species presence), most (six) of the studied schemes incorporate some element of input conditionality (i.e., fines or bonuses for certain actions). Some fines take the form of "points" deductions, for example, for every snare found, for every fire caught on a camera trap, for placing camera traps outside of pre-agreed areas, or for carnivore killing events. Fines can be less direct, too: in one scheme, snared animals pictured on a camera trap earn zero points, regardless of their original "value." Fines also take the form of withdrawal of payments, with longer periods for the most serious offenses, such as carnivore killing. For example, one scheme implements a policy whereby if a lion is speared to death illegally, payments are withheld for 6 months. If one is poisoned, this period is doubled.

In another scheme, the performance payment is augmented with bonus "points" for the participating units that obtain "the most lion pictures, the best picture, and the rarest picture...in terms of biodiversity." Participants also receive ∼USD 470 up-front as a bonus upon signing the agreement. Other schemes add (or deduct) "points"

depending on the quality of livestock enclosures, while another also has bonus payments for "lion bed-nights," where a lion spends the night on village land.

Relatedly, schemes differ in how they respond when camera traps are destroyed, lost, or stolen. These events are a common occurrence, and interviewees attributed them to opposition to the presence of camera traps from those illegally hunting wildlife, who were mostly considered to come from outside the area of performance payment implementation. Some schemes replace the camera traps but wait between 1 and 6 months to do so. This can be considered an indirect fine (due to a lack of monitored wildlife) and is typically intended to reduce the rate of camera vandalism through inducing social pressure. One scheme waits 4 months to replace any cameras and also imposes a ~USD 660 reduction in payments. In another, if cameras are lost to natural causes (e.g., floods or wildfires) they are replaced, but if stolen, they are not—although participants can choose to use their performance payment earnings to buy replacements.

Of the schemes that use camera traps, most collect evidence of illegal activities, such as people "walking with a gun and a dog, and then two hours later walking back with a sack-full of meat." Interviewees associated with performance payments in two countries noted that state conservation agencies had asked them to hand over such images (both refused these requests—"despite their big disgust with us!"). There is a fear that these government agencies perceive the NGOs as "not cooperating," and such a situation is "difficult to navigate" due to the need for government permissions, such as research permits. Most interviewees were keen to highlight that they delete any such pictures at the first opportunity and referenced the need to maintain participants' trust. Two interviewees noted that it would be difficult for an organization to implement a conservation performance payment if they have a history of working in conservation enforcement, as "camera traps are very scary," and there can be "a lot of suspicion." Where this is the case, "the cameras don't stay out there for long until people put a spear into it." This is because of a perceived fear that the images will be used "as a tool of persecution," where individuals are punished for behaviors seen as incompatible with conservation. Alternatively, where trust is greater, "communities ... are very protective over them." It was suggested that permanently fixing the cameras in specific locations may have helped to reduce mistrust regarding their purpose.

3.3 | Governance

Agreements are typically signed by representatives of local governance structures (e.g., village chairmen and village/ward executive officers) and/or traditional leaders (e.g., chiefs and elders). Only one of these schemes pays individuals; the rest pay groups. In these, decisions on how the money should be spent are most commonly made through pre-existing local governance structures (e.g., village councils), although one scheme constructed its own elected committee.

Most interviewees acknowledged some shortcomings or inequities inherent in their governance system. For example, one interviewee noted how "village leaders need something for their personal benefit. So if you don't [give] the personal benefits to them, sometimes their cooperation can be not 100%." Schemes typically persist with their chosen system for two reasons. Firstly, because some prioritize "building the capacity in the communities for the leadership," even if this comes at the cost of some inequities. Secondly, because working through pre-existing structures (where inequities often arose) provides schemes with legitimacy and avoids antagonizing locally important people (e.g., politicians).

One CPP, operating in a protected area, must have its expenditure approved by the relevant government conservation authority. This has presented a barrier to the use of funds, as some decisions (i.e., the extension of a water pipe and the repair of a school roof damaged by a storm) have been rejected on conservation grounds. Restrictions on expenditure are also imposed by some performance payment operators, but these tend to be "rather broad, because it is anything that is anti-conservation." For instance, the operator of one scheme is "very bullish" that participants have the right to choose: "it's their money, they decide ... as long as [they] don't do anything like buy an AK-47." So far, they have only chosen to buy food, typically in the form of sacks of maize, "which shows you how food-stressed they are." In this area, crop losses from floods and a violent insurgency have made many participants' livelihoods even more precarious, but the interviewee believes that the CPP has "helped them hugely." Food has also been chosen in another scheme, despite the fact that the interviewee originally wanted expenditure to be on more "tangible" items, so that the link between the benefits and conservation performance would be more apparent. In any case, they considered it a great success that participants have since chosen items likely to reduce human–carnivore conflict, such as "fence-posts and cement for bomas."

Some CPPs mandate that certain proportions of the earnings are spent on specific sectors. In one, participants "had to spend a quarter on health care or education, because otherwise that never would have happened," and it was "what would have the highest impact." In two others, either 70% or 100% must be spent on certain sectors (education, veterinary medicines, and health

insurance), with the perception that "these benefits get spread wide, both on a societal and individual or household level."

4 | DISCUSSION

While some scholars argue that payments for inputs alone (like maintaining agreed land-use zones) constitute CPPs (e.g., Dickman et al., 2023), the prevailing conceptualization is that they focus completely on outcomes (Zabel & Holm-Müller, 2008, p. 247; Zabel & Roe, 2009). This distinction matters because the directness of payments is likely to relate to their cost-effectiveness (Drechsler, 2017; Ferraro, 2001; Ferraro & Kiss, 2002; Ferraro & Simpson, 2002). However, we find that such a distinction might not be so clear-cut, because most of the schemes analyzed here complement their results-based payments with elements of input conditionality (i.e., fines and bonuses). Researchers and practitioners should therefore be explicit in their discussions of "performance payments" as the terminology is open to interpretation and is already being used to refer to fundamentally different things, such as aspects of conservation bonds (Karolyi & Tobin-de la Puente, 2023, p. 244).

There is significant variation in how these CPPs function in practice, despite the fact that they all broadly target the same species and are operated by NGOs, in contrast to the state-run performance payments of the Global North (e.g., Chen et al., 2022; Hiedanpää & Borgström, 2014; Zabel et al., 2014). The CPPs analyzed here use different payment systems and pay different amounts at different regularities. Furthermore, while most schemes used camera traps to monitor carnivore presence, there is no consistency in how such data is used to guide payments. There are a number of possible reasons for this variation. It could be that their nascency means the relative merits of the different approaches are not yet known, or that their near-simultaneous implementation and limited knowledge sharing have precluded adaptation. The current lack of empirical research on CPPs limits our ability to make external comparisons, but it could simply be that there is no "best" approach, with different socio-ecological contexts meaning that what works in one site may not work in another.

For example, each payment system has advantages and disadvantages. Schemes using a relative payment system, for instance, benefit from the fact that the amount of money disbursed each cycle is always the same. This allows the operator to more accurately budget and gives an element of security to participants, who know how much money is available each cycle. Relative payments may be better when external influences outside of participants' control (e.g., drought) are a concern (Zabel & Roe, 2009), but less so when the presence of carnivores is strongly influenced by actions on neighboring lands (Drechsler, 2017). Additionally, because such schemes pay for relative carnivore numbers, there is a risk that participants may collude or even sabotage others' performances (Zabel & Engel, 2010). The big drawback of relative payment systems is that even if carnivore numbers were to decline, the operator would continue to pay the same amount: relative payments dilute the results-based nature of performance payments. Conversely, because continuous payment systems tie payments directly to carnivore numbers, they incentivize the "delivery" of this service until a cap (if present at all) is reached. In any case, interviewees' choice of payment system was not driven by such considerations but primarily by budgetary concerns.

These budgetary concerns meant that only one scheme made payments greater than the cost of livestock lost to the relevant carnivore species (as judged by interviewees). This is slightly surprising, given that this is theoretically a key strength of CPPs over similar schemes, such as compensation. This finding echoes previous research, which shows that even state-operated schemes may struggle to take full advantage of the strengths of performance payments. For example, a Swedish scheme that pays for carnivore reproductions in reindeer-herding areas has not increased payment amounts since 2002, despite rising costs (Åhman et al., 2022). CPPs will fail to incentivize tolerance when they are perceived to be less than the costs of large carnivores, and significant and sustainable funds are required to maximize their broad-scale equitability and reduce global "coexistence inequalities" (Jordan et al., 2020, p. 804; Hamm et al., 2024). Unexpected financial shortfalls (or scheme termination) may also result in antagonism toward conservation entities and goals.

One area of interest is alternative funding arrangements. One CPP in Laos is entirely funded by ecotourism fees (Eshoo et al., 2018), and a scheme under development in Botswana aims to be partially funded by local photo-tourism operators, as an acknowledgment of the contribution it would be expected to make to wildlife presence (J. Isden, personal communication, June 28, 2023). At a larger scale, representatives of schemes within and beyond our study regions are hopeful that the sale of biodiversity credits may fund their CPPs (J. Hamm, personal observation), although this risks further commodifying nature (Martin-Ortega et al., 2023).

It is important to be explicit in terms of behavior change because different threats (e.g., intentional poisoning and unintentional snaring) have different drivers (Gandiwa, 2011), and this should inform the targeting

and modality of payments. It may also influence the monitoring approach taken. For example, in some parts of southern Africa, poisoning has, in the last decade, become the most common way to kill lions (Everatt et al., 2019). In these contexts, camera traps are probably the most suitable carnivore monitoring method because indiscriminate killing methods (such as poisoning) are unlikely to be reduced if only one species has value tied to its presence (Pettigrew et al., 2012), and monitoring multiple species is easier with camera traps than with telemetry or spoor data.

The use of camera traps does mean that "human bycatch" (the unintentional capture of images of people) must be considered (Sandbrook et al., 2018, p. 493). Mistrust and suspicion regarding the use of such images result in camera traps being destroyed or stolen, which makes CPPs less effective and more expensive. Schemes may be able to increase trust by having a trusted community representative present during the download of camera images, or through increased communication and interactions with participants (Kansky et al., 2021), as was reported in a Swedish CPP (Persson et al., 2015). This may also contribute to a greater perception of benefits associated with the target species (Bruskotter & Wilson, 2014), but such trust-building is difficult when those destroying the cameras are from outside the area of scheme implementation (as was reported here). Regardless, it is imperative that scheme operators follow guidelines for the ethical use of camera traps (Sharma et al., 2020) and ensure that their use does not contribute to any data injustices (Pritchard et al., 2022).

Only one of the schemes analyzed here was implemented prior to 2020, and four more remain in development across eastern and southern Africa, in Botswana, Kenya, and Namibia. Combined with interest from further afield—including Cameroon, the United States, Nepal, and Pakistan (J. Hamm, personal observation)—there is a risk that their roll-out is moving faster than our understanding of them. First and foremost, it is still unknown if and how CPPs alter behavior (Persson et al., 2015), and how scheme design may influence this. This information is required to ensure that CPPs are evidence-based (Sutherland et al., 2004) and not just another conservation "fad" (Redford et al., 2013, p. 437). Secondly, work is required to assess how their effectiveness relates to their equitability, and how this might vary across contexts.

5 | CONCLUSIONS

By acknowledging the costs of living alongside dangerous animals, CPPs have the potential to make conservation fairer at the global scale (Dickman et al., 2011; Hamm et al., 2024; Jordan et al., 2020). In some contexts, CPPs can also help to ensure that basic human needs are met. However, local inequities can arise despite thoughtful governance; scheme designers should be mindful of factors that may reduce the compatibility of social and environmental goals in the context of their CPP.

We recommend that researchers and practitioners pool their knowledge so that lessons learned once need not be learned again. Progress is being made in this regard, with the inaugural meeting of a CPP "coalition" having taken place in January 2024. Here, operators of CPPs met with others considering their implementation to share insights and develop a network to discuss all aspects of design and management.

Most importantly, without understanding if and how CPPs reduce carnivore-killing behavior, their continuing roll-out risks being misguided. It is critical that greater importance is given to evaluations of their effectiveness and mechanism of action to ensure the efficient use of conservation funds. Although CPPs are seen as a promising tool, enthusiasm should be tempered by the current lack of evidence for causal behavior change.

CONFLICT OF INTEREST STATEMENT
In line with research permit conditions, prior to submission this manuscript was reviewed and approved (without changes) by Tanzania Wildlife Research Institute (TAWIRI). The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study may be available on request from the corresponding author. The data is not publicly available due to content which could compromise the anonymity of research participants.

ETHICS STATEMENT
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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.