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Human-elephant conflict in the Sri Lankan dry zone: investigating social and geographical drivers through field-based methods

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Abstract Human-elephant conflict (HEC) in Sri Lanka has escalated over the recent years, with, on average, 300 elephant deaths annually and human casualties of around 90 per year. Employing field-based qualitative methods, this contribution identifies causes and contexts of human-elephant conflict in those parts of the Sri Lankan dry zone most severely affected. We have used field observations as well as semi-structured interviews with experts and affected villagers as primary data collection techniques. The findings show that (a) human-elephant conflicts are the result of land-use decisions, encroachment on elephant corridors, changes in agricultural production systems, and commercialization of land, and that (b) there is a deep division between the environmental knowledge and practices of rural people and the conservation governance provided by government authorities. Furthermore, both traditional and modern mitigation approaches fail to reign in HEC effectively. The insufficient implementation of HEC mitigation measures, and a severe disconnect between the needs and anxieties of rural people and conservation policies, render the management of human-wildlife interactions ineffective. This suggests a need for fundamental reform of elephant conservation policy in Sri Lanka.

Keywords Human-elephant conflict · Elephant conservation · Conservation governance · Sri Lankan biodiversity · Environmental subjectivity

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Introduction

Problem statement

Villagers in the Sri Lankan dry zone are subject to frequent hostile encounters with wild elephants (Fernando et al., 2019). Elephants forage in fields and destroy home gardens and fruit trees, and sometimes break into houses and feed on stored grains. Wild elephants also regularly kill humans. Human-elephant conflict (HEC) is defined as the violent competition for shared resources between elephants and humans (Hoare, 1999). Escalating HEC in Sri Lanka's elephant range territories causes fear and economic

hardship, but also leads to lethal violence against the endangered Sri Lankan elephant *(Elephas maximus maximus)*. While human-elephant conflict emerges in virtually all elephant range countries, driven by rapid land-use change and habitat loss (Shaffer et al., 2019), Sri Lanka displays an extraordinary intensity of the phenomenon in recent years (Fernando, 2015; Fernando et al., 2019). Statistics indicate that, on average, more than 300 elephants have been killed each year from 2015 to 2021, with a peak of 407 in 2019 (WNPS, 2021), while the human death toll averages at 90 per year. Most elephants are apparently intentionally killed, either by gunshot, poisoning, electrocution or through homemade explosives hidden in vegetables *(hakkapattas)*. Train accidents also occur but are comparatively rare.

Sri Lanka is an important site for the conservation of the Asian elephant *(Elephas maximus),* as it hosts a sizable number—about 10%—of the global population under the condition of high density (Fernando, 2015; Fernando et al., 2011). The data on elephant and human fatalities suggests that HEC in Sri Lanka has risen alarmingly. The continuation of current conflict trends might lead to a degree of elephant lethality up to a point where extinction of the Sri Lankan wild elephant population becomes a probable outcome in the mid-term (WNPS, 2021), as subpopulations might become isolated in fragmented habitats and genetic diversity is compromised (Fernando, 2000; Sukumar, 1993). At the same time, HEC comprises a concern for the well-being of economically vulnerable subsistence farmers (Fernando, 2000). Economic losses from elephant raids on crops and home gardens, and the psychological effect on villagers, have strong repercussions for both rural development and biodiversity conservation. The management of human-elephant conflict in Sri Lanka hence presents a serious dilemma and a "wicked problem" (Cassidy & Salerno, 2020).

Researching and discussing human-wildlife encounters raises questions of ontological and methodological nature, like justice aspects in wildlife management (Mollett & Kepe, 2018) or cultural dimensions of interspecies relation (Oriel & Froloff, 2020); questions that are rarely addressed from an interdisciplinary perspective. Therefore, it is salient for research on human-animal interactions and biodiversity conservation to address these aspects and consider socio-economic, geographic, cultural, and

political factors previously overlooked. In this regard, our theoretical outlook is influenced by research traditions in political ecology and critical geography (Adams, 2020; Agrawal, 2005; Benjaminsen & Svarstad, 2021; Robbins, 2019).

The article proceeds as follows: first, key theoretical concepts relevant to the research are discussed. Then, the methodology, research sites, and methods are described. Subsequently, the results of extensive field interviews are presented in a structured manner, followed by a theory-informed discussion of the findings. Finally, we conclude with a recommendation for further research, and a call for adjustments in Sri Lankan elephant conservation policy.

Theoretical approach

Theoretical framework

HEC in Sri Lanka emerges as a complex social-ecological problem (Ostrom & Cox, 2010), touching upon agrarian political economy, the institutional context of natural resource use and conservation, environmental settings and animal behaviour, and the cultural conditions guiding human-animal relations (Köpke et al., 2021). This paper aims to investigate the social, cultural, geographical, and policy dimensions of human-elephant conflict by relating them to conservation policies and rural environmental culture, using qualitative methodology. How do affected rural communities perceive their situation? How do they evaluate the role of government in elephant conservation practice and conflict mitigation? What is the role of land-use change and habitat loss? Why do mitigation methods persistently fail to protect communities? How is human-elephant conflict impacting relations between rural people and the Sri Lankan government and administrative apparatus?

Our theoretical approach encompasses (a) looking at the *socio-economic dimensions of human-elephant encounters*, (b) investigating the role of geography and land-use change, (c) connecting HEC to environmental subjectivity of affected people through the *rural environmental knowledge and practice*s embodied in the everyday actions of rural people, and finally (d) taking into account *conservation governance* as the key institutional nexus which directs questions of conflict mitigation, (il)legality, enforcement, and planning in the scope of elephant conservation policy.
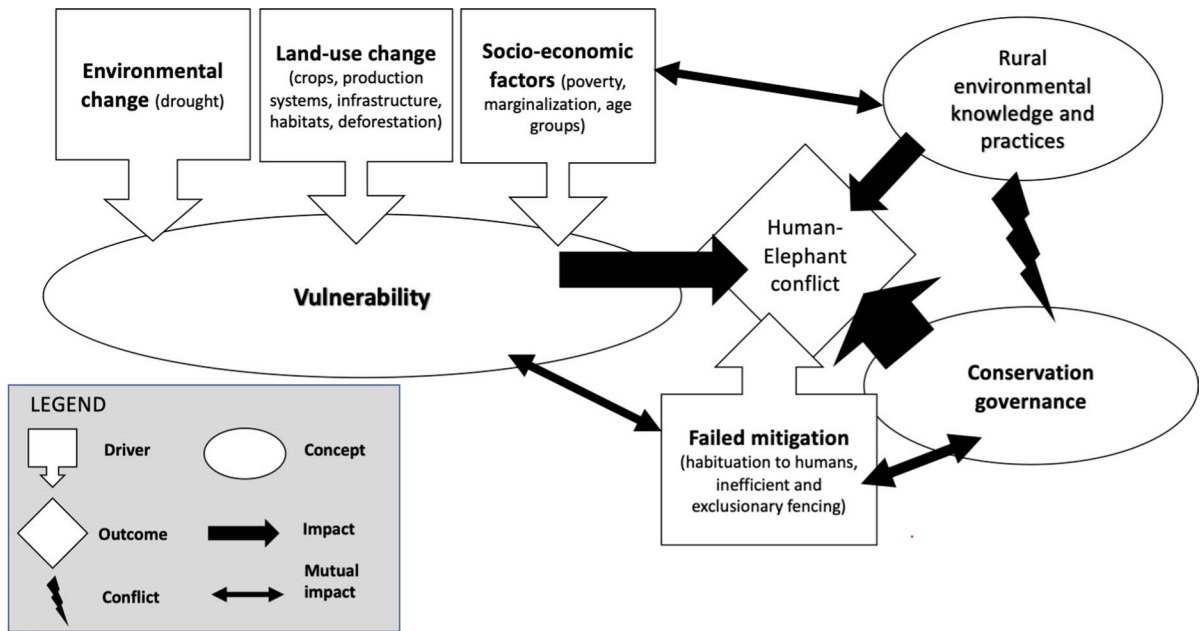
Fig. 1 Human-elephant encounters: environmental, geographical, and socio-economic dimensions. *Source*: Authors' illustration

Fig. 1 illustrates how these different factors are combined in a theoretical framework. It treats environmental, socio-economic, and geographical factors as drivers, while rural environmental knowledge and practices—as the expression of villagers' environmental subjectivity—and conservation governance—as the outcome of government and civil society actions—are seen as factors interfering with HEC and with each other. The different elements of the framework will now be discussed in turn.

HEC has a very strong economic dimension, as elephant crop foraging behaviour leads to massive economic loss in farming communities, and elephant ranges overlap with land areas intensively used by humans (Hoare, 1999). Hostile behaviour of "problem elephants" is often specific to single male elephants (Fernando et al., 2012). When a single male is in musth (a hormonal rut-like condition characterized by a rise in testosterone levels and secretion of the temporal gland), it has been perceived to display aggression (Perera, 2009). However, newer ethological research questions direct connections between musth and aggressive behaviour (Keerthipriya, 2020; LaDue et al., 2022).

Habitat loss from encroachment on elephant habitats is considered a main root cause of HEC in most elephant range countries (Shaffer et al., 2019); with reduced food availability, opportunistic feeding on cultivation and grain storage increases. Yet, habitat loss and modification of elephant ranging grounds cannot be conceptualized as a simple function of human population growth, but as an outcome of conscious planning decisions (Köpke et al., 2021). Further, the stark psychological effects of elephant visitation to human homes, as well as human deaths from elephant encounters, must be taken into account. These have a substantial adverse impact on well-being of human communities (Jadhav & Barua, 2012). The persistent feeling of threats from wild animals—in this case, elephants—creates "landscapes of fear" (Toncheva & Fletcher, 2021). Hence, human-elephant conflict is driven by a combination of geographical, socio-economic, and ecological factors, reflecting a high complexity of causalities and contexts.

Environmental subjectivity and rural environmental knowledge and practices

There is a need to understand the cultural perspectives widespread in communities to draw inference on HEC. How do rural people perceive elephants in particular, and their natural surroundings in

general? How do they appraise change in natural environments, as well as their own role in a changing natural landscape? How do they relate to the institutions, in the sense of formal and informal rules (Ostrom, 1990), and organisations that govern conservation and natural resource use?

In the political ecology literature, the question of environmental subjectivity in conservation is a matter of intense debate (Robbins, 2019: 206–222). Agrawal (2005) has brought forth the powerful theoretical concept of *environmentality*. Influenced by the Foucaultian notion of governmentality, it describes how government-led conservation practices have been taken up and internalized by rural communities. This includes the maintenance of conservation practices that may contradict their own economic interests; *environmentality*, therefore, encapsulates a manipulative streak, a subtle but powerful way of governing people's environmental behaviour through informal institutions.

Yet, as Robbins (2000) notes, environmental knowledge "on the ground" is not only the result of manipulation and coercion by the state. Rural environmental knowledge is the product of complex negotiations and alliances between government agencies, local elites, and communities. We take up this notion of rural environmental knowledge, but we stress the performative aspect, the "practice" which translates knowledge into action. Therefore, based on the previous reflections, we summon a new theoretical concept we call "rural environmental knowledge and practices". In our case, it aims to explain the cultural dimension of collective action emerging in human-elephant conflict.

It is important to acknowledge that the observations, beliefs, and practices, in short, the "folk knowledge" (Read & Behrens, 1989) or "rural environmental knowledge and practice", as we chose to conceptualize it here, might sometimes be contrary to established scientific knowledge (for a discussion of this tension, see Folke, 2004; Agrawal, 2009). The purpose of this study is not to evaluate the soundness of rural environmental knowledge and practices, "indigenous knowledge" or "traditional ecological knowledge" as such, but to point towards a reservoir of knowledge that informs rural people's everyday observation, decisions, and actions as part of a social-ecological system.

Conservation governance

As Oriel & Frohoff (2020, paragraph 1) write: "[…] human/elephant conflict occurs within a complex nexus of ecological, subjective, and social relations that inform and emerge from one another". Research on HEC faces significant problems, since an essential part—the willful killing of elephants—is an illegal activity, and perpetrators are unlikely to step forward and admit their deeds. Nevertheless, the act of killing an elephant has a strong rationale. In the face of recurrent elephant visits to villages and economic hardship caused by crop loss and post-harvest damage, lethal acts against elephants could be justified as a last resort, as an act of self-defense. This form of vigilantism would suggest a severe violation of conservation rules issued by the state, and hence a serious obstacle to elephant conservation governance.

Conservation governance refers to the sum of institutions, organisations, and actors invested in nature conservation (Armitage et al., 2012) including policies, laws and ordinances, government-led agencies, voluntary activities of citizens, non-government organization (NGO) campaigns, and private-sector services. Unlike classic mechanisms that solely rely on hierarchical, top-down regulation, modern conservation governance encompasses negotiation and interaction of different types of actors employing different modes of action and different operational logic (Bridge & Perreault, 2009; Pittman, 2019).

Political ecologists tend to suspect a *neo-liberalization* of conservation in current modes of conservation governance (Dressler & Roth, 2011; Fletcher, 2010); neoliberal conservation here defined as positions emphasizing the role of the private sector in fostering sustainable solutions. However, in Sri Lanka, conservation is primarily a state issue. This means most institutions governing biodiversity conservation in the country are directly linked to the state (Gunatilleke et al., 2008), such as laws, regulations, and forestry practices. Sri Lanka is a member of international treaties and has a biodiversity conservation strategy formalized by the responsible authorities (MFE, 1999). The Sri Lankan state owns more than 80% of the land in the country, explaining the primacy of state agencies in wildlife protection and land management. On the other hand, Sri Lankan authorities responsible for conservation, such as the Department of Wildlife Conservation (DWC), seem to suffer

from a lack of capacity and scientific expertise (Pethiyagoda et al., 2007). The Sri Lankan government intends national parks to be part of their poverty alleviation strategy, yet revenues connected to national park management do not adequately benefit the local people living in the parks' surroundings (Kariyawasam et al., 2020).

When local people disobey conservation laws and regulations, this can be read as acts of resistance (Holmes, 2007)—not so much as open rebellion than as "everyday resistance" (Scott, 1985). This form of practical resistance against state-proscribed, often colonial-era conservation rules tends to be multifaceted and ambiguous (Kull, 2002). Yet, while killing elephants in Sri Lanka is clearly a breach of law, it does not necessarily constitute an open act of defiance or resistance against state authorities. Understanding the way HEC interferes with the fragile relations between the government and "the governed" is an essential part of the research presented here.

Materials and methods

The research study was conducted from 2018 to 2022 in Sri Lanka as a part of a collaborative project between the University of Kassel (Germany) and Rajarata University of Sri Lanka aiming to investigate the multiple factors, dynamics, and policies driving human–elephant conflict in Sri Lanka. Research on biodiversity conservation often lacks an explicit social science focus, neglecting the social dimension of social-ecologic complexities emerging from conservation endeavours (Bennett et al., 2016; Sandbrook et al., 2013); yet social sciences should be seen as "a vital component, along with the natural sciences, for effective conservation decision-making during planning, implementation and management." (Bennett et al., 2017: 104). In focusing on stakeholder perceptions and social context, we aim to contribute to an open dialogue between social and natural scientists on matters of conservation.

Research area

Sri Lanka's dry zone is comprised mainly of a cultural landscape which has been shaped by human activity for millennia; the numerous larger and smaller artificial lakes (*tank*s) in the region bear witness to the historical agricultural mode of production which was the base of the ancient hydraulic civilization (Schütt et al., 2013). Such interconnected systems consisting of—usually 2–10—small, large, and medium-sized tanks are referred to as group tank systems and can be found in every river valley in the dry zone (Anuradha et al., 2019; Thennakoon, 2017; Withanachchi, 2017). Unique ecosystems of grasslands and shrubbery have naturally formed around these tanks, providing adequate feed for wild and domestic animals, and elephants in particular. Some ancient tanks, also known as forest tanks or *Kulu Wewa*, mainly supply water to wild animals only. The destruction of the ecosystems close to forest tanks, however, appears to be one of the main reasons for changes in elephant range pattern (Anuradha et al., 2019).

Overall, the elephant population of the Sri Lankan dry zone exceeds the carrying capacity of Protected Areas (PA), according to Fernando's (2000) evaluation. Sri Lanka has 26 national parks, all under the management of the DWC, covering 5,734 km^2; of these, ten are located in the research area. However, HEC exclusively occurs outside these PA (Fernando, 2000; Fernando et al., 2019) since human habitats are not permitted within forest reserves and national parks.

Considering the agrarian structure of the research area, there are ancestral lands belonging to farming families, as well as land belonging to families that had migrated here under older colonization schemes during British rule (1796–1948). After independence, new farmers were settled in the dry zone by the central government under new human settlement programs (Amerasinghe, 1976; Weerahewa et al., 2021). Farmers in the dry zone region predominantly cultivate rice as the main crop. Alongside paddy cultivation, vegetables, and other grain varieties are cultivated as cash crops and livestock management is maintained as part of the local agricultural system (Abeywardena et al., 2019). However, *chena*—one of the traditional farming methods—is still existent as part of dry zone agriculture. *Chena* farming, so-called "slash and burn" agriculture, is based on rain-fed and shifting cultivation. As the result of the "Green Revolution" in the 1970s and the subsequent agricultural modernization process in Sri Lanka, farmers changed their production systems to mechanized agriculture and more intensive application of chemical

inputs and pesticides. As a consequence of profound demographic changes such as population growth and rural-urban migration, allocated farming lands were divided among children, which led to small (<3 ha) and fragmented land plots for each family member (Withanachchi et al., 2014).

Data collection and sampling

The research was conducted throughout the dry zone in Anuradhapura and Polonnaruwa Districts (NCP), Puttalam and Kurunegala Districts (NWP), Vavuniya District (NP), and Ampara and Trincomalee Districts (EP). These regions cover a large extent of the elephant range in Sri Lanka, with exceptions of parts of NP, southern and southeastern regions, and isolated pockets in the Southern dry zone. They comprise greater parts of the regions identified as affected by "major conflicts" with elephants (Fernando et al.,

2019). Fig. 2 provides a map of the research area, highlighting the Grama Niladhari (GN) Divisions— the fifth and lowest-level administrative level—visited by our research teams.

The first exploratory research regarding HEC in Sri Lanka was carried out in January 2016 around Maho, Kurunegala District (NWP) in the form of a field visit and interviews with three key stakeholders. Further interviews with *chena* farmers and other stakeholders were undertaken in September 2018 around Hunuwilagama, Anuradhapura District (NCP) at the fringes of Wilpattu National Park. Interviews were conducted in Sinhalese and translated into English on the spot. In mid-2020, an extended team was able to upscale research activities in the area described above; from June to August 2020, research teams visited villages affected by HEC. 90% of interviews were conducted in this phase. Affected villages were identified through DWC information, and respondents were
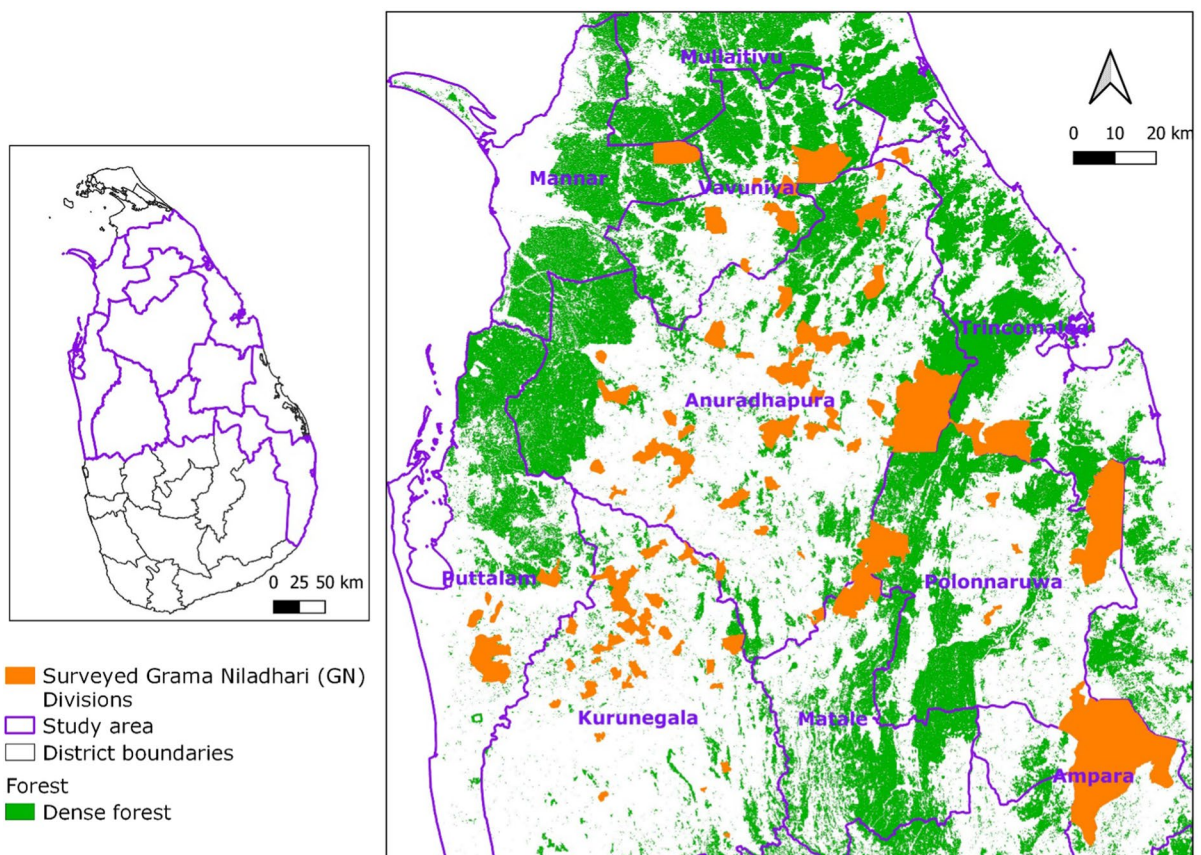
Fig. 2 Research areas within Sri Lankan dry zone. *Source: Authors' illustration / Source for forest cover data:* Shimada et al., 2014

sampled through a snowballing system; the number of interviews (~140) is high for a qualitative study in order to reach theoretical saturation of the empirical data (Low, 2019).

The major part of the study was conducted as semi-structured interviews with members of households of people practicing agriculture in those villages. In addition, three focus group interviews with three to five participants, all of them villagers, took place in June–July 2020 in villages A and B (both Anuradhapura District, NCP, in the same Muslim-majority Divisional Secretariat), and in village C (Tamil-majority DS, Vavuniya District, NP). Further, nine expert interviews were carried out in the same timeframe (for the background of experts see Appendix 1); these interviews were also semi-structured but followed different interview guidelines fitting the respective expertise. Expert interviews are an exploratory tool; they serve to contextualize the findings and also allow access to exclusive knowledge that stems from the position of an expert (Bogner & Menz, 2009). The majority of interviews were conducted in Sinhalese, audio-recorded, and translated into English for the analysis by the multi-lingual research team; two expert interviews were conducted in English, and in Vavuniya District, eleven individual interviews and a groups interview were conducted in Tamil.

Analytical process

Altogether, more than 140 interviews (including expert and group interviews) were analysed for this paper, using qualitative content analysis methodology (Mayring, 2015) which is an elaborate analytical approach, allowing to process large amounts of textual data (Mayring, 2019). The method provides a systematic approach to configuring qualitative, semi-structured interview data for analytical, interpretative purposes. The available interview data was initially coded from the transcripts. The codes were validated by a second member of the research team and then the material was re-coded in an iterative process.

Coding was structured in six categories (see Table 1) deductively derived from the theoretical concepts elaborated above (1.2.1), and then inductively replenished in the second round of coding. The first two categories, "threats" and "habitat alterations/spatial dimensions" refer to the nature of the risk posed by HEC, and to underlying causes. "Cultural beliefs"

is a category that refers to respondent's perceptions of their communities' relations to the natural environment (including elephants), allowing inferences on what we have called rural environmental knowledge and practices. "Mitigation" is an important category that describes efforts to curb HEC, both by agencies like the DWC and on the villagers' own initiative. "Insurance/compensation" covers financial schemes to alleviate economic damage from HEC. The last category, "management/governance", contains expression of the attitudes towards government representatives and politicians in connection to HEC and related issues such as land distribution, water allocation, housing programs, and social welfare facilities

Results

Threats

In interviews conducted in affected villages, respondents expressed elephant encounters as threatening their lives, health or property. In different locations villagers described HEC as increasing in recent years, and it was mentioned that HEC did not appear as a major everyday problem before. According to villager's observations, the number of elephants has increased overall. Whether this is really the case, or if only elephant sightings had become more frequent, is not easy to discern (at the time of writing in 2022/2023, the latest elephant census results have not been published).

Elephant visitations to human-inhabited areas were generally seen by villagers as harmful and causing economic loss. Respondents report repeated and severe damages to field crops and home gardens. Elephants ravaged fruit trees, such as coconut, banana, mango, and jackfruit trees. Elephants can smell fruits and are thus stimulated to enter villages. One person who works with tamed elephants shared the opinion that wild elephants had become habituated to the taste of sweet fruits and other human-cultivated food. They returned for raids after becoming accustomed to this food. One forest officer claimed that tourists who feed elephants exacerbated this problem. Villagers also describe how elephants actively searched for stored crops such as paddy or maize, which results in severe damage to buildings, and thus contributed to the post-harvest loss. In one locale in Mihintale Divisional

Table 1 Coding schemes and selected villager interview excerpts (N = 140)

Coding scheme category	Sub-categories	Example
Threats	Threat from animal	"We are also under threat from peacocks, wild pigs, and monkeys, they also destroy our harvests"
	Largest threat from only elephant	"Aggressive elephants destroyed all our harvest, our storage and ate all new coconuts trees"
	Loss of life	"Our father died three months ago when he was bringing Alms given to 'Danaya' to the temple"
	Injuries	"See, I lost my right-side leg and fully injured the back side. I was totally paralyzed for two years after that elephant attack."
	Destruction of houses	"Our house was fully destroyed by an elephant two years ago. That is why we moved to this village, but here we also have an elephant threat"
	Destruction of food storage	"Here is our paddy storage (…) Elephants are well known in that place and attacked last month and ate almost all paddy"
	Damages to harvest and paddy field	
	Damages to chena	"We cultivated grain in our chena, but elephants destroyed all and ate it, they also attacked our small house cottage and my motorcycle"
	Damages to vehicles	
Habitat alteration/ spatial dimensions	Human encroachment to natural habitat	"Fencing is the best solution. Anyway, there should be space for elephants to pass. The government developed villages independently without any planning. Houses are spread all over the area. There is no well-managed housing area. Villagers encroach into the forests and bush areas where elephants live"
	Chena cultivation	"Although I had been cultivating chena ten years ago, I had given up chena cultivation and resorted to paddy cultivation due to the elephant conflict"
	Water management issues	"Those days, there were no such issues with elephants. Under the Yan Oya Water Management project, elephant paths were blocked. Villagers do not profit from this water management project. People around here are still affected by water [scarcity], but government diverts the water to Pulmude"
	Open-waste dumping with food waste	"The removed garbage from the weekly fair in Mihintale is brought to the bush near our village. Elephants destroy the village when they come to eat the waste"
	Plastics and other non-digestible in an open landfill	"The elephants had died due to the consumption of waste such as plastic"
	Railways and train accidents	"Many elephants are dying from train accidents. In this area, people do not tend to kill elephants. In Welikanda, Dimbulagala, this conflict is increasing compared to past years, but in Higurangoda problems are decreasing"
	Other road accidents	"Here is a dangerous road crossing with an elephant corridor across Wilpathuwa and Kahalla Pallekela jungle, in the evening the elephant is crossing, there was a fatal accident here with vehicles, a famous actor was injured, and the elephant is deadly injured, I do not know what happened to the elephant"
	Hunting on elephants/tuskers for ivory	"Politicians and their henchmen are supporting these illegal tusker hunting, they kill innocent tuskers"
	Mismanagement of elephant orphanage and reallocation	"The Elephant Orphanage is now getting a bad image. It is true. They do not care well enough about their elephants. They use iron chains to control them. It is harmful to elephants. They even do not have enough space and no good food supply, also there are flaws in the waste management system. It is not a good place for elephant breeding place. Elephants are living here as one family. So, it is a negative fact in terms of DNA for the future of elephants"
Cultural beliefs	Elephant as a god	"We respect the elephant as a God as a 'Pullayar/Ganesh '"
		"We have a traditional festival in the tank bund for the Pullayar God with a coconut. A person who tagged this coconut for the God does not have a threat from the elephant. The elephant is not entering to his/her farmland. People believe it"
	Elephant as a symbol of prosperity (Thunpath Rena)	"We believe that displaying the Thunpath Rena image with three elephants on the wall brings prosperity to us"
	Elephant as a cultural symbol	"Though I still have bad memories about the elephant attack and the death of my husband, I still hang this picture with the elephant in the Kandy Perehera on the wall in respect for the elephant. I cannot hate all elephants. The elephant is our cultural symbol that has the respect to carry [the Buddhist artifacts in the procession to the] 'Temple of the Tooth'"

Table 1 (continued)

Coding scheme category	Sub-categories	Example
Mitigation methods	Traditional methods (Manthra) or shouting	*" I know some Ali Mantra and used several times successfully – On Narayane…Deri Eliya Deri"*
	Private electric fence	*"Elephants come at night (around 10 pm). They stay here until morning. We must get special permission for a private electric fence. If the elephant is killed, it is a criminal deed and will be investigated by the district secretary"*
		" If you can afford the money, you can build it, but we cannot. That is why elephant attack our gardens"
	Large scale- electric fence	*"Electric fence is easily breakable and there is no point of having the fence"*
	Trenches as a barrier before the fence (Ali Agal)	*"As the new government program, digging trenches to stop elephants from jumping the fence and coming to the village will not work out. See, how many baby elephants died due to this idiot action last month"*
	Firearm	*" I think, we need firearms from the government, this is not for killing elephants [but] at least [to make] noise" "The firecrackers are not enough"*
	Ecological fencing system	*"Lemon trees and palm trees are used as some fences, sometimes bees as well. Our grandparents also said that they never destroyed fruit trees in the jungle area, so the elephant has enough food in the jungle"*
	Hakkapatas (explosive devices)	*"People use things like crackers, hakkapatas and kureter to chase away elephants"*
	Chemicals	
	Firecrackers	
Insurance	Crop damages	*"We have not insured the crops and insurance companies are also not involved in this case"*
	Compensation for damages	*"There is no compensation for our harvest loss due to the elephant attack"* *"We do not get any compensation from the government. We lost almost one acre from our harvest"*
	Life insurance	*"Fifty thousand rupees pay as an advance in the event of a death and the total amount will pay up to five hundred thousand rupees"*
Management/ governance	Dissatisfaction with government involvement	*"Every government only pursues temporary solutions, all are based on [winning] votes for election"*
	Elephant corridors	*"Our farmers, including maybe ourselves, already extent our paddy fields across the traditional elephant corridors"*
	Corruption	*"I do not trust these politicians and officials, they misused the funds and gave the contract to their favorite contractors with big commissions. In the end, the fence falls after a few months"*
	Weak maintenance	*"Generally, the responsibility to maintain these electric fences lies with Village Security (Grama Arakshka)"*
	Reallocation elephants	*"By shifting aggressive elephant to a new home near to our village, I do not see any permanent solution happened, one elephant already escaped four times from here to his native jungle"*
	Awareness program	*"We do not have any proper training from the government or NGO about the safety and prevention action when the elephant attacks, many school children need this as well. There was a fatal attack from elephants for two school kids, they lost their lives"*
	Wildlife department/Wildlife rangers	*"We do not trust wildlife rangers, they come always late after the elephant attack, or they come with few officials or equipment"*
	People participation	*"Our village farmers association cooperated with the divisional secretary offices and could support the new elephant fence program, but the new government stopped it"*

Secretariat (DS), elephants were even known to come into the villages regularly to feed on garbage that was not properly disposed of.

Rural people interviewed described evening visits to villages. There are accounts of elephants being announced by barking dogs, or elephants are recognized by the "smell coming from their ears". However, some local communities experienced elephant encounters also during the daytime or in the morning hours. The seasonality of elephant raids was mentioned in interviews from two villages, one in NP and one in NCP: Elephants were said to come to villages much more frequently during the dry season when food was sparse in forests and grasslands, as described by a farmer from Wellamudawa (NCP):

"(…)in the monsoon period, the elephants' movements are low, as there are a number of small tanks filling up inside the jungle. "

A different theme is the topic of "problem elephants", which relates to extraordinarily aggressive, male individuals. Human deaths or severe injuries are frequent outcomes of encounters mostly with a single male elephant perceived as hostile, and in eight locations villagers had stories to tell about deaths in their communities or even families. According to a government official in Mihintale DS, injuries—although sometimes leading to permanent disabilities—are much more common than human deaths. The victims of elephant attacks apparently can be found in different age groups—heads of family were victims as well as younger people.

According to expert interviews, damage to elephants' sensory systems from elephant crackers and other noises enhanced their aggression. Furthermore, a retired army general recalled that training areas in rural army camps had a negative impact on wild elephants in the vicinity, as the high-pitched sound of machine gun shooting appeared to distress the animals.

In addition to economic losses, there also appears to be a significant psychological burden connected to elephant encounters. Respondents said that they were afraid to travel or could not go out at all during nighttime. In three different locations, children were reportedly not sent to school in the morning for fear of elephant encounters. In Wahalkada, Anuradhapura District, a schoolgirl had been killed by an elephant when returning from school in the evening, according to an education official. Researchers have also been told that people, desperate because of HEC, had left

Fig. 3 Abandoned house, reportedly left by inhabitants due to HEC. *Photographer: Authors*

affected villages and moved somewhere else. During the exploratory research phase the research team saw abandoned houses which, according to the local key informant, had been left by the owners due to frequent elephant attacks (Fig. 3).

Habitat alteration/spatial dimensions

According to field interviews from villages, geographies and changing spatial patterns in the dry zone have a massive impact as drivers of HEC. Encroachment on forests, deforestation, and construction of houses in elephant corridors were mentioned as root causes of changing elephant ranging behaviour. Especially, the reclaimed land in the southern part of the Mahaweli Development Project (MDP), resettled in the 1970s and 1980s, appeared to be very prone to HEC. The MDP constitutes a large-scale irrigation development program initiated by the Sri Lankan government (Withanachchi et al., 2014). In a group discussion, the Yan Oya irrigation project in the North Central Province was identified as another problematic infrastructure project, where respondents said the project had obstructed elephant corridors and therefore increased HEC. A *bhikkhu* (Buddhist monk) interviewed in Puttalam District (NWP), perhaps referring to conflicts over settlements on the fringes of Wilpattu Forest Complex (Köpke, 2021), related that Muslims had encroached on 400–500 acres of protected forest land, which displaced wild animals and set HEC in motion. An environmental activist mentioned powerful, well-connected people were grabbing land for commercial agricultural activities, contributing to the shrinking of elephant habitats.

Farmers in the Anuradhapura District observed that elephants live in forests dominated by teak *(Tectona grandis)*. One farmer thought these teak forests did not provide elephants with sufficient food, increasing the likelihood of elephant visits to houses.

Chena, a traditional dryland shifting cultivation method for growing vegetables in fields and home gardens, is based on fallow periods of several years. One interviewee explained that "in the old days", farmers cultivated *chena* and did not have extensive conflicts with elephants. During the monsoon, the fallow of previous *chena* fields grew with soft vegetation, which the elephants liked very much, so they left the current *chena* fields alone. In contrast, another

farmer in Kurunegala District (NWP) claimed that he had to abandon *chena* cultivation due to recurring elephant attacks and now cultivates only paddy. A Forest Department officer in Kandy held the opinion that *chena* practices were responsible for forest fires and, thus, were no feasible solution to mitigating HEC.
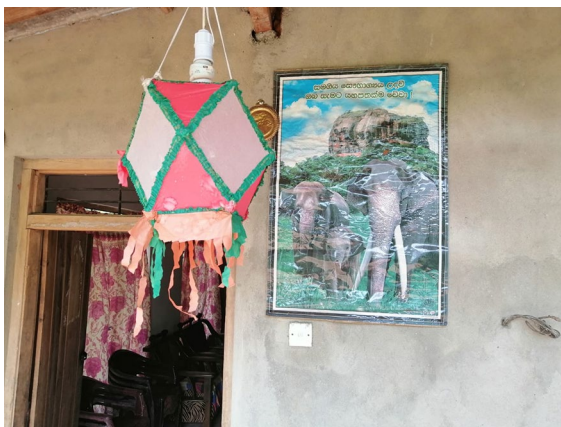
Cultural beliefs

Considering the often violent, economically damaging and frightening character of human-elephant encounters, it was to be expected that public perceptions of the animals would be unequivocally negative. However, we found the perception of animals to be more ambivalent among villagers. There is hardly any expression of open hostility or anger towards the elephants. One woman portrayed the hostile relationship of his son with an individual elephant as a personal feud:

> "Our son has been threatened by the elephant. He is a soldier. He is angry with the elephant. [The] Elephant comes frequently to our home. He is now searching for my son to kill him."

One respondent in Thambuttegama DS (Anuradhapura District, NCP) explained even that "the children in the village love elephants very much".

According to interviews from villages, elephants are seen as "smart"—since they adapt their behavior in reaction to changing environments. Further, one

Fig. 5 The Tamil community, as well as some of the Sinhala community, worship the God Ganesh or Pullayar. *Photographer: J. Mallikarachchi*

interviewee emphasized the impressive physicality of the "giant" elephants. Not surprisingly, none of the people interviewed admitted to having shot or otherwise killed an elephant.

Overall, rural people display devotion and compassion towards the elephant, as it is the largest animal in the country, and is associated with cultural, religious, and environmental values. For instance, the image of a group of elephants consisting of a mother cow, an elephant calf, and an additional adult female, called *thunpath rena*, is seen as a good omen of prosperity and success to the family, and this symbolic imagery can be spotted on posters in homes (see Fig. 4). Members of the Tamil community pointed towards the veneration of the elephant as the god *Ganesh/Pulla Yar* (see Fig. 5) in the Hindu pantheon.

Beyond the religious and symbolic aspects, other ethical aspects of human-animal relations were mentioned, too: two officials expressed the necessity to take elephants' needs into account. A cultural officer said that while elephants acted out of instincts, human beings would have the capacity to restrain themselves and therefore to de-escalate HEC. However, it must be noted that no such balanced expressions came directly from villagers in affected areas.

Fig. 4 *Thunpath rena* image in villagers' home. The Sinhalese text says: "We wish peace, prosperity and goodness for all." *Photographers:* Authors

The villagers reported other, not directly related environmental problems, such as water shortages, wildfires, forest burning for *chena* cultivation, and waste management, pointing towards an uneasy relationship with an unreliable environment. They also recounted conflicts with numerous other wild species, including wild boars, monkeys, peacocks, and parrots. According to a DWC officer, there are no integrated solutions to alleviate HWC beyond the measures in place aimed to address HEC.

Mitigation measures

Fencing

Fencing is seen as a major mitigation method. Where there were no elephant fences, they were the main demand from villagers affected by HEC. The research team frequently heard the sentiment that a "proper fence" was needed. Where fences exist, however, they often appeared to be ineffective. Elephants frequently managed to destroy fences by toppling wooden pillars or even overturning concrete columns; one respondent observed that elephants used tree trunks as tools to damage fences.

What is more, fences' effectiveness allegedly suffered from lack of maintenance, and, sometimes, parts of fences were stolen. Further, sometimes fences were reported to be ill-placed and tended to block elephant's access to forests and water reservoirs, rather than keeping them away from villages. In one village, the fence seemed to block the elephant corridor, and villagers speculated that this made the elephants furious. Two individual respondents and participants in a group discussion argued that it would be more feasible to fence in villages than forest areas to create a barrier for the animals to move into human habitats.

Electric fences appear to be more efficient in deterring elephants if well-maintained, so respondents hoped for a "strong" electric fence. However, some individual farmers have at times been tampering with voltage, with electrocution and death of animals (especially infant elephants) as a consequence.

Fences appear to be the subject of promises by politicians, which tend to remain unfulfilled. A fence constructing contractor claimed that many villagers were not satisfied with government services with regards to fencing. Private fences erected by farmers on their own initiative are costly to build and maintain. Several respondents said they could not secure finances for such efforts without government support. Since well-maintained private fences have the potential to redirect elephant attention to other nearby places, they were only relocating the conflict to less well-secured areas, providing no efficient mitigation for the problem on the whole. In Omnathai area (NP), for instance, allegedly one village community inhabited by upper caste Tamils was unwilling to share their electric fence with the close-by lower caste village.

Villagers and experts indicated that the private fencing system was mismanaged in several areas, and there was no control or monitoring mechanism in place. Some private fences were constructed by farmers or other locals who lacked adequate technical knowledge. Some fences operated under high voltage, which could harm humans as well. As a consequence, this fence system curbed social interactions in the evening hours: people did not visit neighbors in the evening since they feared accidental collisions with electric fences.

Natural deterrents and barriers

Planting crops and fruits which elephants appear to dislike were sometimes mentioned as a possible solution to HEC. For instance, Sri Lankan elephants are believed to avoid citrus plants (Santiapillai et al., 2010), so the scent of the citrus plants (lime trees) is meant to act as a natural deterrent to elephant raids

Fig. 6 Traditional watch hut near Hunuwilgama, NCP, Sri Lanka. *Photographers: Authors*

and promises additional income to farming households. According to some interviewees, cashew also was a cash crop eschewed by elephants. One elderly couple in Nuwaragam Palatha Central DS (Anuradhapura District, NCP) complained that planting lime trees did not work for them since the elephants arrived nonetheless:

> "Even though we had already planted lime trees, elephants attack our houses and harvest. We do not believe these traditional methods."

Guarding, disturbance by noise, and other traditional deterrence methods

A defensive strategy against elephant raids is found in traditional watch huts in the form of tree houses or elevated huts (see Fig. 6). These huts allow farmers the early detection of marauding elephants (and other animals). When elephants are spotted, the field guards shout, make noise, utilize fire and bright lights, throw firecrackers, and sometimes give warning shots. Often these measures can scare away elephants. Still, there are indications that individual elephants become habituated to these scare tactics and cannot be contained by them. Indeed, villagers have reported that elephants do not scare as easily as some years ago.

The guarding of fields is highly labour-intensive and therefore takes a heavy toll on the available household labour. Yet, according to interviews in different villages, the guarding activities also appear to have a social function, as villagers report a sense of community from getting together to dispel the animals.

While only a few respondents demanded the license to own private guns "for protection", many said that private gun ownership was not a solution. Some recommended the use of bay or gas rifles (air rifles).

Talking to elephants

Two villagers mentioned that "speaking to elephants in a gentle manner" and "asking them to go away" was an effective methods to avoid harm. According to three other interviewees, there are notions of traditional spells or powerful words, sometimes called *ali mantra* (*ali* means elephants in Sinhalese), which work to expel elephants. One villager attributed the

practice to a traditional doctor. The use of spiritual words (*mantras*) is a common feature of South Asian folk religion and culture and is often misunderstood as a "magic belief" by Western scholars (Burchett, 2008). The knowledge of these traditional spells seems to be largely lost, according to interviews.

Insurance/compensation

While only two respondents at two different locales said they had some kind of insurance for extreme climate events (floods and droughts), but not for elephant raids, others claimed they were not insured at all. People in at least seven different villages emphasized that their livelihoods depended on farming and others stressed that they were not able to cultivate certain crops, for instance, pumpkins or mangoes, due to the frequent raids of elephants.

A prominent aspect is the question of compensation for loss and damages. A number of villagers claimed that they had received no compensation at all for material damages caused by elephants, while others had collected payments for destroyed houses and crop losses but complained that the sums were not sufficient to repair damages. Compensations were regularly paid out to the victims who suffer bodily harm, or to the families of persons killed in animal encounters. For the death of a household member, a family would receive Rs. 100,000, roughly 450 Euros (others said Rs. 500,000) from government funds, distributed by the DWC and the DS.

Management/governance

Interviews highlighted widespread disillusionment and dissatisfaction with government and wildlife authorities regarding a solution for HEC. It was claimed the government had "no plan" and failed to give proper attention to the issue. Petitions and requests towards responsible authorities to deal with the problem did not reap satisfactory results. Experts have also lamented the lack of coordination between government agencies and the lack of support of other agencies for the DWC. According to an expert interview, the DWC was seriously understaffed, and is very much preoccupied with HEC, leading to the neglect of other important conservation issues. Villagers felt that DWC officers did not take their grievances seriously, were

not well-trained and only cared about wildlife's well-being. Wildlife officers were accused of causing damage to elephant fences themselves "so they can work overtime and be paid for this". In another instance, villagers told an anecdote where DWC officers called to capture a "problem" elephant held festive get-togethers and drank alcohol but did not catch this elephant. Elephant drives and translocation operations undertaken by the DWC are seen as problematic: some interviewees indeed mentioned that "aggressive" elephants translocated from other areas caused problems in their villages.

Distrust of politicians' motives, in general, was an often-heard sentiment. Engagement in HEC was seen as solely motivated by the desire for re-election and as an empty promise. For example, a local Member of Parliament from Anuradhapura District was accused of using Horrowpothana Elephant Holding Ground as a "fake project" and a decoy for harvesting timber from the PA. High-level political figures were deemed incompetent to handle such a complex matters, or they were accused of ignoring real-life problems such as HEC in favour of economic gains. Members of the Tamil community in Vavuniyawa Districts specifically lauded the proposed plan of an appropriately designed, interconnected fence system directly under the surveillance of villagers. Another problem expressed by members of the Tamil community is the language barrier between wildlife officers and locals.

> "We also have a language issue connected to HEC. Most wildlife officers only speak the Sinhala Language. Our people cannot speak Sinhala, they speak only Tamil. Elephants can understand the village people better than wildlife officers can. We need to encourage people to use both national languages."

Discussion

The analysis of stakeholder interviews, both villagers and experts, is based on the theoretical stance that human-elephant conflict has multiple causes: ecological factors (seasonal droughts and animal behaviour), spatial factors, in particular land-use changes (encroachments on PA and elephant corridors),

change in agricultural production and settlement structures, as well as socio-economic factors are seen as direct drivers of HEC in this area.

The research clearly confirms that HEC is perceived as a serious and escalating threat to human safety, livelihoods, and well-being in rural communities in the dry zone, confirming earlier research among affected farming communities in Sri Lanka (Fernando et al., 2019; Santiapillai et al., 2010). A main reason for this threat is the foraging behaviour of the animals, which is evident in Sri Lanka as much as in all other elephant range countries (Shaffer et al., 2019; Hoare, 1999). Sri Lankan elephants appear as opportunistic feeders who have overcome their shyness towards humans in search of food. Villagers observe a notable link between drought periods and more intensive foraging behavior from elephants. Further, during times of drought, elephants often seek water and come to the reservoirs around the villages. Seasonality and night/dawn activities confirm previous findings recorded in the literature (Campos-Arceiz et al., 2009; Fernando et al., 2005).

Some of the citizens' observations expressed in field interviews regarding aversion to noise confirm recent developments in research on elephant behaviour. Ball et al. (2022) and Mumby and Plotnik (2018) point toward the sensitivity of elephants to auditory disturbances. Ball et al. (2022) mention that current mitigation measures do not seem to take the complex sensory systems of elephants properly into consideration. As noted by interview respondents, age and sex of elephants are also of importance to understanding crop foraging behaviour, as emphasized in the existing literature (Fernando et al., 2015; LaDue et al., 2021; Chiyo et al., 2012), since adult males are most likely to cause damage and harm.

Land-use changes play a significant role in explaining spatial patterns of elephant crop-raiding behaviour. HEC in Sri Lanka started to occur in the dry zone after elephants were displaced from the wet zone in 19th century colonial Ceylon (Fernando, 2000). The above-mentioned presence of elephants in teak forests appears to be notable. Teak is a tropical hardwood of Indian-Burmese origin and became a widespread monoculture tree for timber production during the British colonial period. It was used as a popular reforestation tree since Ceylon's independence as it yields high-value timber. Indeed, teak monocultures are not suitable habitats for elephants and

other wildlife, partially due to soil erosion and the lack of undergrowth (De Zoysa, 2016). The neglect of well-managed and undisturbed elephant corridors may also contribute to adverse encounters with foraging elephants, as is the case in other national settings like India (Deb et al., 2023).

A crucial spatial aspect for understanding HEC in Sri Lanka is *chena*: several authors (Anuradha et al., 2019; Fernando et al., 2005; Lorimer, 2010) share the observation that *chena* cultivations benefit human-elephant cohabitation. In general, *chena* cultivation has been disincentivized by agricultural extension agencies. According to numerous statements, it is barely tolerated by the authorities and in certain places even illegal. The effect of *chena* on human-elephant cohabitation remains inconclusive from our study; while some respondents reported the historically positive impact of traditional *chena* cultivation on human-elephant cohabitation, others did not see advantages. It appears to be worthwhile to further investigate forms of land-sharing between wild animals and crop cultivation (Crespin & Simonetti, 2019) in order to facilitate convivial forms of human-wildlife co-existence.

The most direct socio-economic consequence of HEC is economic hardship caused by yield loss and property damage. As elephant encounters apparently diminish the quality of life in heavily affected areas, the psychological factor must not be underestimated, as already highlighted by Jadhav and Barua (2012). In addition to trauma and fear resulting from injuries and deaths in the family, the presence of dangerous animals impairs the freedom to move around. The fact that villagers apparently were even prepared to leave their homes points to a decline of social capital in rural communities due to adverse human-elephant conflict. It is also clear that negative impacts on well-being of members affected by human-elephant conflict are not distributed equally, but differs according to social stratification (wealth, land tenure, education, and caste), mirroring findings from Kenya (Nyumba et al., 2020). Any efforts to address human-elephant conflict should therefore focus on the well-being of affected households and communities.

Fencing appears to be both the greatest hope for mitigating problematic elephant encounters and also the greatest disappointment. The interviews point to numerous problems as fences are either just empty promises, are in disrepair, or are controlled by private landowners. Unintended social and ecological consequences of fencing have been observed in other national settings, and questions regarding the cost-efficiency of erecting and maintaining electric fences have been raised (Montgomery et al., 2022; Pekor et al., 2019). Although efficient electric fences were desired by a large number of respondents, they do not appear as a panacea to mitigating HEC.

Meanwhile, citrus plants and other proposed "natural" solutions, like chili-based deterrents or beehive fences, which have been implemented in different regional contexts, were inconclusive in their efficiency. All these measures are experimental and have not been deployed successfully on a larger scale (Fernando, 2015). Translocation and elephant drives are concerted actions targeting either individual elephants or groups, intending to displace them from areas where they have caused harm. These measures are undertaken by the DWC each year (DWC, 2013, 2017, 2019). Conservationists are extremely skeptical of the effectiveness of these measures and view them even as detrimental to elephant conservation and conflict mitigation (Fernando et al., 2012). For example, Horrowpothana Elephant Holding Ground (Anuradhapura District, NCP) is designed as a reserve for "problem animals" to be translocated there, but the project has been evaluated as unsuccessful (National Audit Office, 2019). Translocated individuals can cause problems in new surroundings, as the findings suggest.

We investigated the environmental subjectivity of affected villagers. Surprisingly to researchers, field interviews did not show widespread hostility against or negative perceptions of elephants per se. The perception of the animals is culturally mediated and oscillates between fear and anger, but also admiration and appraisal of the salience of elephants' presence in Sri Lanka (Bandara & Tisdell, 2005). This reflects a recent finding from Myanmar, where respondents also stressed the cultural importance of elephants (Samson et al., 2019, Samson et al., 2021). Rural stakeholders' understandings of the environment appear to differ drastically from the eco-consciousness of urban middle classes, which are increasingly organized in line with global ideas on nature conservation and environmentalism (Camisani, 2018; Köpke, 2021). These urban attitudes are prone to influence policymaking on environmental regulations, including elephant conservation, as middle-class urban people have better access to public

discourses, and tend to have a very positive image of elephants (Bandara & Tisdell, 2003). At the same time, villagers and expert report traditional and symbolic approaches to human-elephant coexistence, such as the *ali manthra*, which in the eyes of interviewed people used to be powerful, but whose workings were now mostly lost. These sentiments conjure almost nostalgic images of a past when human-elephant coexistence was generally less hostile and elephants were rather seen as "companion species" (Lorimer, 2010). However, human-elephant encounters in 19th century Ceylon were characterized by large-scale colonial sport hunting and were therefore by no means less violent than today (Fernando et al., 2012; Sukumar, 1993).

Interviews have revealed strong indications that rural environmental knowledge and practices are at odds with the conservation governance activities of the government in general, and the DWC in particular. Villagers paint an image of a negligent and incompetent government apparatus. Politicians are portrayed as fraudulent and corrupt, and even appear to contribute to the willful destruction of forests for profit-reasons, thus exacerbating HEC. As reflected in our empirical data, there is a profound disconnect between rural people and the representatives of the government. What is observed in the context of HEC is a violation of the "social contract" that binds central government and peasant constituencies together. Socio-economic challenges and the terror of recurring elephant raids on fields and villages combine to affect rural communities' outlook on government legitimacy. The emphasis on the state apparatus as the central, albeit incompetent actor in conservation governance contradicts the critique of "neoliberal" modes of governance in the literature on the political ecology of conservation (Dressler & Roth, 2011; Fletcher, 2010). Sri Lanka is emerging here as an outlier case, or at least as a polity that evades general trends in conservation governance. However, Benadusi (2015) observes an emerging neoliberalization at least in the management of Ruhuna (Yala) National Park, the most-visited and arguably most commercialized national park in Sri Lanka.

The state-centred character of elephant conservation, and the inadequacy of the conservation strategies in place, emerge as part and parcel of the HEC problem complex in Sri Lanka. HEC mitigation in Sri Lanka is at times rendered useless by inconsistent management practices, lack of attention to rural

realities, and ambiguous conservation governance. What is more, failure of formerly successful mitigation mechanisms, lack of feasible solutions, futile attempts to keep marauding elephants at bay, and increasing despair form a vicious circle. Where traditional methods of deterrence stop working due to the habituation of elephants to human activities, and where fencing and other barriers are inadequate or merely shift the problem to neighbouring areas or the settlements themselves, mitigation efforts are progressively perceived with frustration. There is a feedback loop where failed mitigation in itself enhances the severity of HEC. The uneven distribution of resources, for example, the ability to build and maintain efficient fences to keep away animals, reinforces the exposure of that part of the population already more negatively affected by elephant encounters. Finally, failed mitigation strategies erode trust in conservation governance and may encourage "self-organized", clandestine actions, leading to elephant deaths from gunfire, explosives, poison, etc. Taking elephants' lives appears less as open resistance (Holmes, 2007), but as a "last resort" in the face of failure or absence of other, less violent mitigation measures like traditional vigils and scare tactics, fencing, or natural deterrents. Ultimately, the illicit killing elephants emerges as a self-organized form of pest (and damage) control – one that is highly illegal, but usually not sanctioned.

Conclusion

This qualitative study was able to develop an important contribution to the theoretical understanding of human-elephant conflict in Sri Lanka regarding multiple and interrelated factors. In particular, this research study revealed contextual and directly contributing elements of the HEC complex that were analysed in an integrative theoretical framework taking into account social, cultural, geographical, and policy dimensions. An approach that includes questions of conservation governance and land policies is more likely to produce conclusive insights than a focus on environmental or economic variables alone. The study has its limits; first of all, the sample size and heterogeneity of semi-standardized interview results do not permit a conclusive quantitative analysis. Analysing a larger sample will allow us to formulate hypotheses and test statistical explanations based

on the theoretical concepts explored in the scope of this study. Secondly, future research would benefit from asking precise questions on the interlinkage of shifting wildlife habitats, land-use change identified through GIS, and human-elephant conflict by focusing on a single locale as a case study.

Mitigation of HEC necessitates close attention to all sorts of drivers including elephant ranges, group behaviour, food provision, and the spatial and technological design of fences, but also themes referring to governance.

The often-ambivalent attitudes of villagers toward elephants reinforce the centrality of locally embedded environmental knowledge and practices. This is highlighted by the frequent use of traditional methods such as communal night watches, ecological knowledge connected to chena cultivation, or *ali mantra* spells. Our research suggests that a realignment between conservation governance and rural environmental knowledge and practices is urgently needed to enhance the legitimacy of elephant conservation. This encompasses a fundamental reform and upscaling of compensation payments for crop losses, in order to make the compensation process more transparent and accessible. What is more, deforestation should be halted and reversed wherever possible. Awareness campaigns should target affected villages and enhance the understanding of elephant behaviour to diminish the likelihood of lethal encounters.

Declarations

Appendix A

See Table 2.

Table 2 Expert Interviews

Expert No	Occupation/background
1	Member of the Tamed Elephant Association, Sri Lanka
2	Retired high-ranking officer, Sri Lankan Army
3	High-ranking education officer
4	Divisional secretary (highly affected DS)
5	Divisional secretary (highly affected DS/Tamil-majority region)
6	Village officer
7	Divisional forest officer, Department of forestry
8	Wildlife ranger, DWC
9	Leading environmental activist

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