Viewing Bornean human–elephant conflicts through an environmental justice lens

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Abstract: Sabah, on the northeastern corner of Borneo, is concurrently Malaysia's largest producer of oil palm (*Elaeis guineensis*) and home to the endangered Bornean elephants (*Elephas maximus borneensis*; elephants). Concomitantly, Sabah has been experiencing increasing and unsustainable human–elephant conflicts (HECs), which have not been thoroughly investigated from a human dimensions standpoint. To address this void, in March 2019, we conducted semi-structured interviews with 37 villagers located in the Sabah districts of Lahad Datu, Tawau, and Telupid to investigate villager cognitions regarding elephants, behaviors toward elephants, the formal and informal village institutions employed to mediate HECs, and the future viability of human–elephant coexistence. Respondents highlighted emotions of fear, anger, and frustration over crop and property damage that villagers were unable to effectively mitigate employing traditional institutions and strategies. Although negative emotions were somewhat tempered by the cultural significance of elephants, respondents indicated that coexistence with elephants remains challenging and is likely only viable under certain conditions: domestication of elephants, if elephants no longer destroyed crops, and/or if elephants were provided separate forested habitat away from humans. Our results demonstrated that elephant conservation in Sabah is viewed as a "not in my backyard" claim, which can hint at the presence of environmental injustice. We further examined Sabah HECs using an environmental justice framework and concluded that HEC as an environmental justice problem requires traditional fixes to be merged with more extensive, sustainable solutions that improve stakeholder agency.

Key words: Borneo, Bornean elephants, *Elaeis guineensis, Elephas maximus borneensis*, endangered species, human–wildlife conflict, NIMBY, oil palm, Sabah

In 1982, the state of North Carolina, USA created a landfill in an economically poor African-American community to dump PCB-contaminated soil (polychlorinated biphenyl; McGurty 2009). The resultant civil protests around the landfill were dubbed "the marriage of environmentalism with civil rights" (McGurty 2009, 15) and the beginning of the environmental justice movement in the United States, and ultimately worldwide (Schlosberg and Collins 2014). Bose (2004) stated that viewing environmental problems with an environmental justice lens involves attending to the ways in which the human rights–democratic accountability nexus underpins these issues. An array of social and economic justice sub-movements are germane, including occupational and public health and safety and contested Indigenous territories movements (Faber and McCarthy 2003). More specifically, there is a need to focus on the existing environmental justice paradigm's role in remedying injustices and inequalities upon marginalized groups via the distribution of and access to environmental costs and benefits (Taylor 2000, Bose 2004, Schlosberg and Collins 2014), including human–wildlife conflict (Schnegg and Kiaka 2018).

Unequal distribution of environmental costs and benefits is a common point of emphasis within the environmental justice movement and associated literature (Schroeder et al. 2008). Much research has been conducted on the
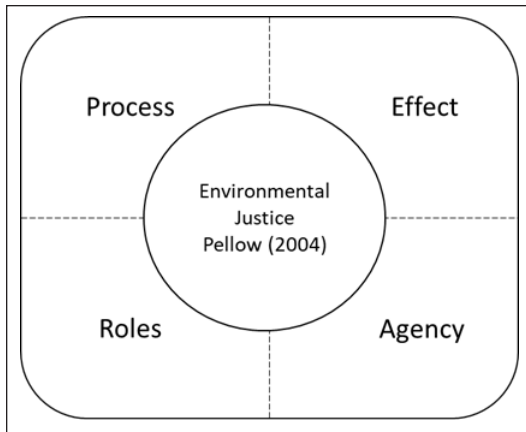
Figure 1. The 4 dimensions of the environmental justice framework based on Pellow (2004).

unequal distribution of costs (e.g., inequalities related to who bears the burden of hazardous waste [Rowan and Fridgen 2003], air pollution [Jerrett et al. 2001], and water contamination [Imperial 1999]). However, in a natural resource management context, the framing shifts to an unequal distribution of benefits and consequences (Schroeder et al. 2008).

Researchers have investigated injustices related to water resource access (Mehta et al. 2014), gold mining revenues (Urkidi and Walter 2011), and bioprospecting (McAfee 1999). These studies highlight the socially imbalanced character of policies designed to conserve and protect natural resources. Similar patterns arise when using a justice framing of the social impacts of wildlife conservation. For instance, the creation of protected areas has been fraught with cases of environmental injustices toward locals displaced from or denied access to land (Cock and Fig 2000, Dahlberg et al. 2010). Serenari and Peterson (2016) chronicled how a series of sociopolitical forces catalyzed the illegal take of wildlife in the United States in response to societal prejudices. Paloniemi et al. (2015) found that governance arrangements satisfying special interests generated injustices related to cost and benefit distribution but also power and knowledge sharing in Finland, Greece, Poland, and the United Kingdom. Researchers have also detailed how markets, specifically certain industries, can catalyze environmental injustices. For example, wildlife tourism is prone to injustices because revenue-sharing and cost-distribution arrange-

ments favoring those in power often disproportionately harm Indigenous peoples (Schroeder 2008, Schnegg and Kiaka 2018).

Whyte (2010) noted that environmental justice problems and "not in my backyard" (NIMBY) claims are often interlinked. The NIMBY claims are often invoked when people theoretically approve of an issue (e.g., one's approval of the use of wind energy as opposed to fossil fuels) but reject the terms in which the practice is implemented (e.g., one's disapproval of wind turbines installed in their backyard; von Essen and Allen 2020). Researchers have argued NIMBY claims can serve as indicators of an environmental injustice because, in situations of social and economic inequality, privileged communities may have the political and economic resources to successfully convince policymakers to address their NIMBY claims and shift the burden to an underprivileged community, perpetuating an environmental injustice (Feldman and Turner 2010, Whyte 2010, Feldman and Turner 2014, von Essen and Allen 2020). Conversely, those lacking social and economic resources will likely not have their NIMBY claims deferred. Although not all NIMBY claims necessarily intersect with the occurrence of an environmental injustice in theory (see Whyte 2010), previous research successfully using NIMBY in a wildlife context offers precedence (von Essen and Allen 2020) for applying it in the case of human–wildlife conflicts (HECs).

Like other integrated approaches used to frame and contextualize socioecological problems (e.g., optimization under constraints; Wintle et al. 2011), Pellow's (2004) 4-dimension environmental justice framework (Figure 1) can be used to help situate the data in this study. The dimensions are not mutually exclusive and interact with each other to produce inequality. The first dimension highlights the importance of considering the sociohistorical processes involved in the environmental inequality, rather than simply viewing it as a discrete event. The second and third dimensions involve understanding the complex role of the stakeholders engaged in the situation and the effect of social inequality on these stakeholders, specifically being mindful of how peoples who are lower on the social hierarchy are more likely to suffer environmental injustices. Finally, agency, which is the power peo-

ples have to confront inequalities and shape the outcomes of these conflicts, is required to fully comprehend a conflict (Pellow 2004). We note that it is this agency that is called into question when NIMBY claims are ignored. By analyzing our results using this framework, we are able to include the context of social inequality in our examination and offer an innovative evaluation of human–elephant conflicts that better reflects and addresses the environmental injustices occurring in Sabah.

Researchers have raised justice concerns over the oil palm (*Elaeis guineensis*) industry and transnational, monoculture palm plantations (Fast 2009, McCarthy 2010, Pye 2010, Orsato et al. 2013). Recording these tensions, a report to the United Nations Special Rapporteur on Indigenous Issues detailed how the rapid palm expansion was facilitated by the widespread expropriation of land, a disregard for Indigenous land rights, and discriminatory laws (McCarthy 2010). In addition to social issues, the oil palm industry has also been identified as one of the greatest threats to Southeast Asian biodiversity (Wilcove and Koh 2010). Once covered in tropical forests, the industry has rapidly transformed the land to accommodate oil palm monoculture, shrinking forest-dwelling wildlife populations and habitats (Wilcove and Koh 2010). In an effort to resolve both social and ecological concerns involving the oil palm industry, several proactive sustainable management and certification schemes took root, with the multi-stakeholder Roundtable of Sustainable Palm Oil being one of the most notable. However, criticisms have been levied regarding the functional efficacy of these initiatives (McCarthy 2010, Pye 2010), and grand challenges remain as rural peoples, wildlife, and palm corporations try to coexist.

One of the well-documented burdens associated with palm oil production is increased human–elephant (*Elephas* spp., *Loxodonta* spp.) conflicts, or the negative interactions of humans and elephants (Othman et al. 2013, Ponnusamy et al. 2016, Suba et al. 2017, Othman et al. 2019). These interactions are increasingly common across Asia and Africa as populations of humans grow and continue to convert natural elephant habitat into human-dominated landscapes (e.g., agriculture; Fernando et al. 2005, Kioko et al. 2008). These adverse interactions have led to

negative attitudes toward elephants and their conservation (Suba et al. 2017) and appeals for residents to alter their behavior or develop ways to mediate HECs (e.g., collective action; Fernando et al. 2005, Nyirenda et al. 2018).

In addition to impacts to elephants, HECs threaten elephants and conservation projects designed to protect them. Human–elephant conflicts can be a detriment to local residents directly and indirectly, mainly through crop and property damage, threats to personal safety, fear and psychological stress, and increased workloads (Fernando et al. 2005, Ogra 2008, Ponnusamy et al. 2016, Suba et al. 2017, Gogoi 2018, Nyirenda et al. 2018, Joshi and Puri 2019, Saif et al. 2019). The asymmetrical toll on rural livelihoods may lead locals to develop institutions (formal and informal rules [Ostrom 1998]) and retaliate against and injure or anger elephants, and wildlife authorities may respond by culling problem elephants in an attempt to reduce conflicts (Kioko et al. 2008, Othman et al. 2013) but also introducing questions about the future feasibility of human–elephant coexistence in these areas.

We believe that employing an environmental justice framing in the HEC context will improve our understandings of the distributional inequities associated with HECs. Reinforcing the use of an environmental justice framing of HECs will elucidate the burdens on local people living with elephants as those most impacted by their protection (see Schnegg and Kiaka 2018) and present novel ways to conceive of and design coexistence strategies in monoculture landscapes and island ecosystems.

To address this need, we employed an environmental justice framing to analyze the historical and present relationship between oil palm production and HECs in Malaysian Borneo. The state of Sabah is the largest producer of oil palm in Malaysia (Othman et al. 2019) and provides a case study to explore these connections and implications for people and elephants as well as other megafauna. To complete our case study, we interviewed villagers and interpreted their cognitions (e.g., attitudes, beliefs, norms, values; see Jacobs 2012) toward interactions with elephants, villager behavior toward elephants, the formal and informal village institutions that mediate HECs, and villagers' views on the future viability of human–elephant coexistence
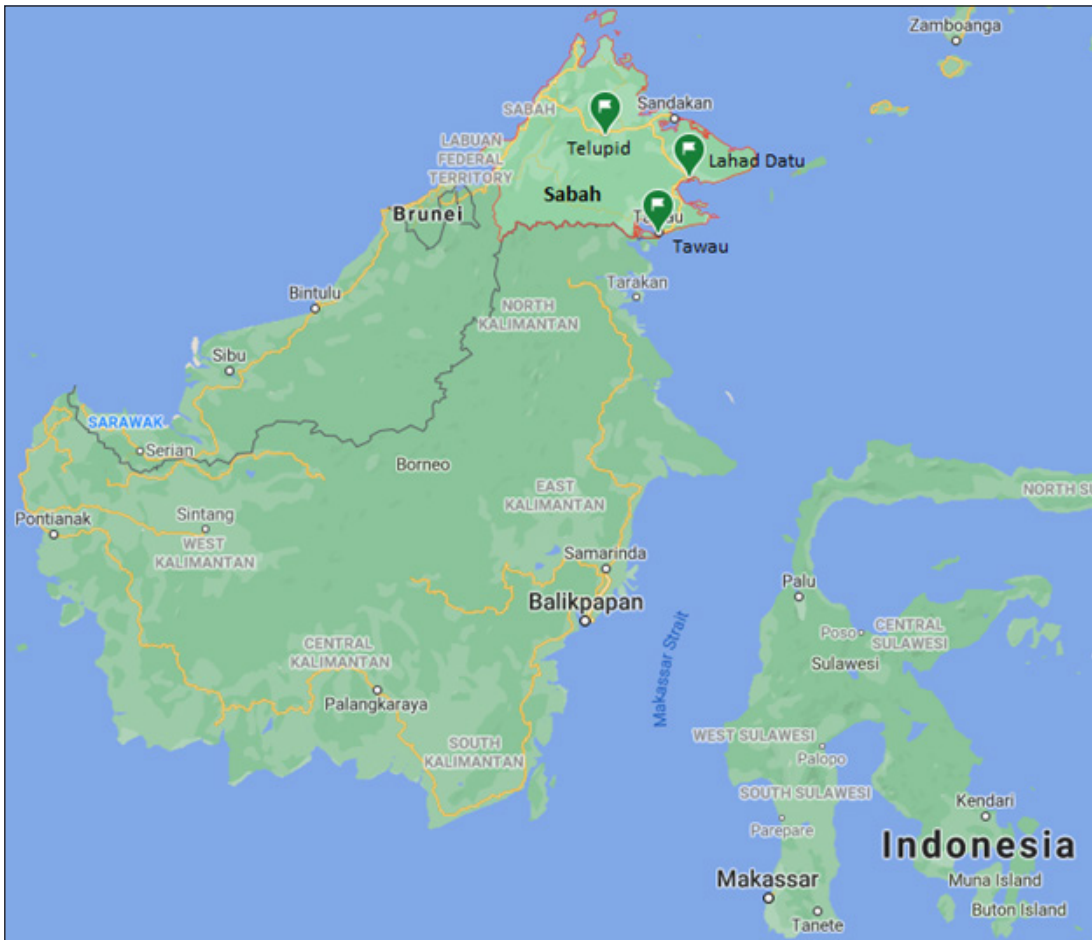
Figure 2. Map of Sabah, Malaysia, and 3 district study areas.

with an environmental justice framework. We argue that when viewed as an environmental justice problem, societies require that traditional human–wildlife conflict fixes be merged with more extensive, sustainable solutions that address underlying issues and injustices.

The goal of our research was to add knowledge to the underdeveloped human dimensions of HECs in Borneo literature by employing semi-structured interviews to document local stakeholder perceptions, cognitions, and behaviors regarding elephants, elephant damage, and future coexistence with elephants. We used our results to offer evidence of elephant conservation as a NIMBY claim—a novel conception of HECs. We used the NIMBY claim as an indicator of a potential unjust governance approach to HECs, hence justifying our final and broadest contribution of framing HECs in Sabah within an environmental justice framework.

Study area

Human–elephant conflicts are occurring in Sabah, Malaysia on the island of Borneo (Figure 2), which is home to the majority of the world's Bornean elephants (*E. maximus borneensis*; Othman et al. 2013). Five key Managed Elephant Ranges (MERs) have been identified within the forests of Sabah, for a total of 1,359,346 ha of habitat (Suba et al. 2017). The 2 largest MERs (the Lower Kinabatangan range and the central forest of Sabah) are commercial forests, where logging is ongoing and there is some conversion to mono-plantations and silviculture activity. The 3 smaller MERs are forest reserves (Ulu Kalumpang Forest Reserve and Lower Kinabatangan Range) and a wildlife reserve (Tabin Wildlife Reserve), although these include areas that are fragmented and encroached upon by oil palm plantations (Suba et al. 2017). In total, approximately 2,000 indi-

vidual elephants inhabit these key MERs.

The displacement of elephants in Sabah from the forest began with timber extraction (Othman et al. 2013). After decades of declining logging revenue, the Malaysian government and large corporations turned to oil palm production to maintain revenue for the socio-economic development of Sabah, including the 261,264-ha Government of Malaysia–United Nations Development Programme (UNDP) project initiated in March 2012 (Othman et al. 2013). Sabah now contributes approximately 10% to global palm oil production and is the largest producer of palm oil in Malaysia. Land use change has come at the expense of long-range land use planning, however, negatively impacting elephants and other native species (Othman et al. 2013, 2019).

Reduced available habitat threatens the existence of wild Bornean elephants in Sabah. Additionally, HECs are increasing particularly in areas close to MERs and bordering plantations (Othman et al. 2019). With their historical migration corridors destroyed or obstructed by human settlement and electric fences erected to protect the oil palm from elephant damage (Estes et al. 2012), elephants are increasingly moving through and relying on private lands (Othman et al. 2019). Conventional thinking has not adequately considered severe impacts to traditional elephant routes and habitat connectivity (Othman et al. 2019), particularly during flooding (Estes et al. 2012). For instance, electric fences have been erected to safeguard palm stands of all ages, and there is a false positive perception of fencing placed around older palm stands. However, these fences are not actually preventing elephant damage from occurring, as elephants prefer trees <5 years of age (Othman et al. 2013, 2019). Fencing reduces the land available for elephants to roam, heightening the potential for HECs in nearby communities, those who are least capacitated to prevent HECs (Estes et al. 2012). There is hope for a land-sharing strategy, however, as forested lands in Sabah are still highly suitable habitat for elephants (Alfred et al. 2012).

We chose 3 villages in different districts in Sabah for our data collection: Kampung Sri Darun in Lahad Datu, Kampung Iban in Tawau, and Kampung Imbak in Telupid (Figure 2). These villages were chosen based on the frequency of HEC reports received by local wildlife authorities. We further divided each village into high conflict, medium conflict, and non-conflict zones. The heads of the villages helped us identify potential respondents living in each zone.

Methods
Data collection and analysis

We employed a rapid assessment qualitative approach (Beebe 2001) to elicit the broad range of experiences of smallholder oil palm producers (Berg 2001). We used selective (key respondent) sampling (Thompson 1999) and subsequent referral-based sampling (Biernacki and Waldorf 1981) to maximize this range of diverse perspectives in the study area. Our sampling strategy was not intended to achieve representativeness; we intentionally approached individuals with direct knowledge of or experience with HECs. We used a refined, semi-structured interview guide tested for a 3-village pilot study to collect data from respondents (N. Othman, Kinabatangan Orangutan Conservation Programme, unpublished report). We employed semi-structured interviews because we sought to answer some standardized, predetermined questions and to allow participants to introduce new concepts or insights that they deemed important (Berg 2001). Questions included respondents' experience with and knowledge of elephant interactions in their community, how they managed these interactions and the perceived efficacy of their management, and their perceptions of elephant conservation in Sabah (Appendix I; approved by Texas State University IRB #6716). To ensure clear and valid interview instruments in respondents' native Bahasa language, we used a forward and backward translation process (Marin and Marin 1991). Researchers fluent in these languages completed and digitally recorded the interviews with permission from the respondent.

Translation and transcript services were procured by native Malaysians fluent in Bahasa and English and checked by members of the research team to expedite preparation of digital recordings for analysis. Each author conducted an independent coding analysis of the interview transcripts to identify emerging themes. Detailed codes (e.g., "grandmother," "respect," "communicate with elephants," "gentle,"

Table 1. Respondent representation by district, Sabah, Malaysia.

District	Conflict	Medium conflict	No conflict	Total
Lahad Datu	8	2	2	12
Tawau	9	2	2	13
Telupid	8	2	2	12
Total	25	6	6	37

"wild," "aggressive") were categorized into broader themes (e.g., "cultural significance," "language to describe elephants"). We then compared codes and themes to ensure consistency as an intercoder reliability check (Berg 2001). Our analysis concluded when new ideas or concepts were no longer emerging (i.e., theoretical saturation; Fusch and Ness 2015).

Results
Demographics

We completed 37 interviews with smallholders from March 11–15, 2019 (Table 1). Except for 1 respondent, we interviewed smallholders or their family members who assisted primary landowners with land management. Targeted smallholders exclusively grew oil palm or a mix of oil palm and fruit. They typically owned 1–6 ha, with 1 respondent owning 24 ha. The remaining respondent was a laborer who worked on a smallholder's lands. Twenty-six respondents were male and 11 were female. The average age of respondents was approximately 50 years old, and the average length of time living in the community was approximately 39 years.

Villager cognitions about human–elephant conflicts

Negative interactions between smallholder stakeholders and elephants and the resulting forced, tenuous coexistence was becoming the norm: "[destruction from elephants] is the routine of our life." Respondents described the detrimental effects of increased elephant presence, which was ascribed to habitat loss, often attributed to industry.

Twenty-four respondents expressed frustration and despair due to routine crop damage (primarily oil palm and bananas [*Musa* spp.]) from elephants (Figure 3). The remaining respondents never experienced damage, rarely experienced damage, or experienced damage

in the distant past. The destruction of property, often water tanks (Figure 3), cited by 6 respondents, produced negative attitudes. Seven respondents mentioned deficient compensation for their material losses.

The state's hands-off approach to HECs occurring on private lands was problematic for those with undiversified livelihood portfolios: "[elephants] frequently come to the village and eat the crops and I get upset. Oil palm is the only source of income for our family. If the elephants are around it's a huge burden to us."

Damage-based interactions typically cultivate fear, as 28 out of the 37 participants explicitly noted feeling fearful toward elephants, particularly due to their large size. This sentiment was expressed even in instances where respondents had never seen elephants. We identified 16 counts of feeling physically threatened by elephants. Fears included charging elephants and the potential for family members and pets inside and outside of homes to be trampled:

"The elephant does give the villagers trouble. First, it destroys our crops and secondly, they could break our homes or vehicles because they are big. I didn't go to my garden for almost one month because I am scared. I have four dogs and the elephant trampled all of them…I cannot sleep at night when the elephants were around."

To figuratively describe the linkages between fear and HECs, respondents discussed uncontrollable "wild" elephants: "I am worried and scared. The elephant is wild and dangerous." Notably, only 3 respondents (all from Telupid) generally described elephants as "aggressive," although 7 other villagers noted that elephants can become aggressive if harassed by people: "they will be aggressive if we disturb them." Conversely, 4 respondents explicitly mentioned that elephants do not kill or harm people, but 3 of these respondents were still scared of elephants.

Negative interactions with elephants driven by fear and destruction led to the majority of respondents (n = 24) feeling that elephants did not provide any clear personal value and are considered a burden and detriment to their livelihoods. One respondent stated, "the elephants have no value. They destroyed all our crops," while another asserted, "I don't think they have

Figure 3. Oil palm (*Elaeis guineensis*; left) and water tank (right) damage from elephants (*Elephas maximus borneensis*; *photos courtesy of N. Othman*).

value, the elephants are pests." However, 9 respondents mentioned the potential for touristic value, although they had not personally experienced this benefit. Only 2 respondents expressed that elephants provided a cultural or intrinsic value: "firstly, the elephants have value because they are the kings of the forest. Secondly, they are valuable for tourism. We cannot take the elephant's presence for granted."

Villager perceptions of elephant presence

Despite many of the negative attitudes toward elephants and the destruction they can cause, many respondents did not blame elephants. Interviews revealed that respondents perceive HECs to be a relatively new phenomenon caused by external factors that altered elephant behavior. All 25 respondents from Lahad Datu and Tawau expressed that HECs are a recent problem. Some respondents offered a range of dates (e.g., starting in 2015, 2018, "the past few years"), but most respondents simply compared "before" to "now" when sharing their recent increases in interactions with elephants. Respondents in these districts all agreed that elephants were once rarely seen because the animals stayed in the forests and away from villages. Perceptions from Telupid were mixed (unrelated to our conflict zone categorization), with about half of respondents echoing that elephant interactions have increased over recent years. The other half noted that elephants were once more visible but

have since left or return seasonally.

Twenty-three of 37 respondents made the clear causal linkage that elephants enter their villages because habitat loss has led to elephants attempting to find food outside of their natural habitats. For example, 1 respondent stated, "the main factor is [the elephants'] natural habitats are now converted to oil palm plantation. When the forests vanished, there were no more food resources available for elephants." Similarly, another respondent assured, "actually, these elephants are not trouble-makers; if they have areas that are able to give them food then they will not come to our area." A corollary to this point, 11 respondents indicated that palm oil or timber companies are culpable in the displacement of elephants from their original forest habitats. Some respondents did not prescribe an explanation, but they generally noted that elephants were "just trying to survive" and that people should not "be too hard to the elephants, they are just animals." Respondents who articulated the relationship between habitat loss and increased elephant interactions often expressed empathy and pity for the animals:

"Elephants are just like us. They want to live, too. The elephants should not destroy the crops, but we understand why they do that, because they need to find food. We do feel sorry for the elephants, but for certain people it's difficult because that's their source of income to feed their family."

Figure 4. Noise cannon used to drive off elephants (*Elephas maximus borneensis*; *photo courtesy of Sabah Wildlife Department*).

A few respondents also offered additional interpretations of increased elephant presence in their villages. For example, 5 respondents mentioned that there are "different" kinds of elephants—either in the context of current elephants being different than past generations of elephants, or that some elephants are "gentle" and some are "wild." Additionally, 1 respondent hypothesized that elephants raid gardens more often because they are becoming "more bold because they are familiar with people."

Mitigation response

To avoid negative interactions, smallholder respondents use numerous strategies to drive elephants out of their gardens and away from their homes and villages. Thirty respondents mentioned taking personal action to drive elephants away. This took the form of scaring elephants away with light (e.g., fire, torch lights, lamps), sounds (e.g., noise cannons [Figure 4], firecrackers, beating on water tanks), or smells (e.g., burning tires). Nine respondents from Lahad Datu and Tawau indicated that they rely on similar community efforts, where neighbors assist each other in driving away elephants. Many respondents noted that, at best, these actions created temporary solutions, although some respondents found particular strategies, such as noise cannons, tire burning, and firecrackers, ineffective because elephants have become habituated to these stimuli. Eight respondents expressed an interest in using electric fences to keep elephants out of their gardens, but all 8 lamented that the cost is prohibitive and, therefore, had yet to try this tool they believed would be effective at mitigating HECs.

Eighteen respondents explicitly stated that they do not seek to harm elephants when they take action to drive them away. For example,

1 respondent noted, "we never throw the firecrackers directly at the elephants. We were just trying to scare the elephants away." Most of these respondents attributed this to a desire to respect or care for elephants: "we don't have the heart to hurt the elephants."

Institutions governing human–elephant interactions

Our research identified 2 formal institutions playing key roles in determining the responses deemed appropriate for handling HECs. These formal institutions linked primary smallholder stakeholders to secondary stakeholders related to HECs, namely government personnel. First, complaints against elephants are to be routed through the Sabah Wildlife Department (SWD). Respondents regularly stated that they requested assistance from SWD or contacted their village leader who would contact SWD on their behalf. However, the legitimacy of this formal institution is questionable. Twelve respondents expressed discontentment with SWD's response to HECs, while 6 respondents were satisfied with how SWD intervened: "we called the SWD but they ignored our reports…they came but very late, and when they were here, they just used their noise cannon here and there, as if they were playing around." Second, bans on killing problematic elephants were effective deterrents of illicit behavior for the few respondents who mentioned destroying elephants. Two respondents indicated they do not hurt elephants because of government protections, fearing that the Malaysian government will take action against them if they retaliate.

Seventeen respondents alluded to the cultural importance of elephants, a critical informal institution deployed in an HEC context, which restricts smallholders' perceived agency in handling HECs. Frequently, respondents stated that elephants needed to be treated with respect and that they should not be harmed or harassed. These respondents agreed that one should not speak poorly of elephants or disturb their dung because they can sense it and will "give you trouble." For example, 1 respondent explained, "our ancestors have a relationship with the elephants. According to my father, we shouldn't speak bad things toward the elephants. We should respect them." This was often paired with the belief that elephants can "read our mind and heart,"

which was frequently mentioned in the context of respondents politely asking elephants to leave their villages. Many of these respondents referred to elephants as "grandmother" out of respect, with 1 respondent noting that the "elephant is the legacy of our ancestors" and "we just said with respect, 'please go, grandmother,' and the elephants just passed [by] our garden."

The dissonance between respecting elephants and the damage they caused proved to be a frustrating paradox for some respondents. One respondent alluded to an apparent contradiction in the cultural significance of elephants and material damage they cause, claiming, "if they are our grandmother, then they will not eat or damage our crops." Other respondents elaborated on an apparent cultural devaluation of elephants in Telupid, where elephants used to be "part of our ancestral beliefs, but now we don't hold the same beliefs anymore." Drawing a finer-grained evolutionary demarcation, another respondent noted that, "before, the elephants understood what people say, [but] not like nowadays" because current elephant populations are different from the old ones.

A future living with elephants

Given their negative interactions with elephants, respondents recognized significant obstacles to coexistence. However, their inability to improve their prescribed, involuntary roles as elephant conservators suggests limited agency to modify their situations. There were mixed responses related to who owns Borneo's elephants, which led to differing responses about who should be responsible for their conservation. Fifteen respondents indicated that elephants belong to SWD or the government in general. Accordingly, the Malaysian government is obligated to assist with HEC mitigation: "we begged, 'please help us to control the elephants from coming to our land.' The government must play their role." Other responses to ownership included the World Wildlife Fund for Nature (3), God (3), all villagers present (3), and no one (2). Despite this, only 7 respondents specified that SWD is responsible for managing elephants, with an additional 2 respondents mentioning that someone must take responsibility for them, although they were not sure who, suggesting they were impotent without someone stepping forward to help: "if there is no one

who wants to take the responsibility to look after the elephants, then what should we do?"

Thirty-one respondents stated that elephants should be protected from harm for a range of reasons. Eight respondents appealed to the intrinsic value of elephants, stating that it is important for future generations to see elephants: "it's our heritage, for our future generations. We want our kids to still be able to see the elephants." Two respondents indicated that they felt pride in their elephant populations, saying it would be "our loss" if they went extinct: "only we have these animals, and they're almost extinct, so I feel sorry for them." Three Telupid respondents commented that the material value of elephants to the tourism industry could be a reason to keep them around, though a burden to villagers.

Thirteen of these 31 respondents asserted that elephant conservation should occur in distinct areas separated from villages (e.g., fenced-off forests), whereas a few others generally mentioned that they supported conservation efforts as long as elephants cannot harm people or crops. For example, "[I agree that elephants should be protected]…if they stay in the forest, if they come to the village, they will only cause trouble," and "if there are dedicated spaces, and people to look after them, then maybe we could keep them from extinction."

Respondents provided their views on a potential future sharing the landscape with elephants. Eight respondents said that they would not be willing to live with wild or destructive elephants, but if elephants would leave crops alone, sharing the land would be tolerable. For example, 1 respondent stated, "if they don't destroy or damage anything then it is also possible to share the landscape with them." A respondent added, "if they don't bother us then it should be fine." Regardless of the positivity of interactions, only 3 respondents indicated that humans and elephants could "live in harmony." Many respondents indicated that they would be open to sharing land with elephants, but with significant caveats. Nine respondents stated that the only acceptable future arrangement is separate forested areas for elephants, away from human villages: "sharing the land with the elephant is impossible because we are different. If possible, we separate them because the elephants damage the crops." Five respondents stated that, due to the "aggressive," "unpredictable," and "danger-

ous" nature of elephants, they do not wish to live around elephants: "they cannot live with us because they destroy our land. It is impossible for us to be their friend." Eight respondents reasoned that "domesticating" or "taming" elephants would neutralize the dangers posed by wild elephants to humans or crops and provide value to humans: "if we domesticated them, then they will follow our instruction. If they don't destroy or disturb us, then its ok." An additional 2 respondents suggested a zoo-like arrangement where elephants are artificially fed so that they do not have to eat crops: "maybe if there is food available for the elephants then they will not enter our village, just like they are given food in the zoo."

Most respondents considered ways to avoid mounting tensions, with 31 respondents stating that they had contemplated switching or would like to switch crops in an effort to reduce damage from elephants. However, these respondents found it infeasible due to the amount of time, effort, and money it would require, with many also adding that changing crops is fruitless because elephants will destroy anything they plant: "I do think about it, but if we change the crops the cost is too big. If we plant the bananas the elephants will still eat the bananas." Only 1 respondent said switching crops was not necessary, and 2 respondents indicated that they may consider changing crops in the future, but they do not suffer from enough damages currently.

Many respondents felt that they were at a loss for actions to take or solutions to help themselves successfully coexist with elephants. Twelve respondents explicitly expressed feeling a lack of control related to elephants and their coexistence with them. For example, 1 respondent indicated, "if they want to come, no one can stop them," and another said, "it's difficult because the elephants want what we want, and it's hard to control them." Nine respondents expressed that they "don't know what else to do." For example, they said, "I don't know any other way. If there are any methods, please share them with us."

Discussion
Human–elephant conflicts as a NIMBY claim

Most villagers would prefer to not have elephants in their backyards, and NIMBY can be viewed as a valid marker of injustice (Feldman and Turner 2010, Whyte 2010, Feldman and Turner 2014) in a wildlife (von Essen and Allen 2020) and specifically HEC context. Nearly half of respondents stated that elephant conservation should occur in locations that are separate from human settlement—not in their backyards. Claims of NIMBY have been recorded where stakeholders theoretically approve of megafauna conservation, but not in its practical implementation. For example, Scandinavian farmers and hunters approve of large carnivore recovery in principle but appeal to NIMBY in their attempts to use ecological arguments to contend that wolves (*Canis lupus*) have the right to exist, but only under certain imposed conditions (von Essen and Allen 2020). Respondents who perceived greater negative socioeconomic consequences from whale conservation tended to oppose protection, which is consistent with a NIMBYism (Hamazaki and Tanno 2002). Wildlife conservation has long presented these implementation conflicts, although documentation does not always include the NIMBY moniker (Gogoi 2018, Schnegg and Kiaka 2018). We argue that the NIMBY claim in Sabah is not sweeping or absolute but is contingent upon involved stakeholders finding the right combination of levers to pull to ensure equitable results. Problematically, injustices have festered without clear or practical boundaries of responsibility or adequate resources to deal with HECs. In essence, villagers invoking NIMBY in the Sabah case is symptomatic of an unjust approach to managing HECs (i.e., a pathology of governance). Our contribution to the pursuit of a socially legitimate coexistence scheme in Sabah and elsewhere is in highlighting the absence of environmental justice in the context of HECs.

Human–elephant conflicts as an environmental injustice

We further analyze our results using Pellow's (2004) environmental justice framework (Figure 1), where we consider how the interacting processes, effects of HECs, and the roles and agency of stakeholders have resulted in environmental injustice. It is important to first consider the sociohistorical process and history of exploitation of smallholders by transnational estates alluded to by respondents, resulting

in a regionally unequal oil palm production playing field across Sabah and South Asia in general. Environmental injustices that enabled the expansion of large-scale, monoculture oil palm plantations, including the expropriation of Indigenous land and discriminatory laws, are well documented (McCarthy 2010). The sociohistorical process is evolving, playing out in terms of stakeholder negotiation of HECs in Sabah. Nearly a third of our respondents attributed the displacement of elephants and subsequent increased local human–elephant interactions to large palm oil or timber companies. Another 60% of respondents were not as explicit but made clear causal linkages between large-scale losses of previous elephant habitat and increased HECs at the village level. These past injustices resulted in transnational estates disproportionately benefiting from palm oil demand and siphoning market share from smallholders, laying the foundation for the inequalities explored in this paper. Villagers are culpable, too, as they have switched from traditional farming to integrate oil palm into their livelihood portfolios or sold or transferred their land to large oil palm companies (Suba et al. 2017). However, it is important to recognize that these decisions made by villagers are in the context of and restricted by their lack of other income-generating activities, which limits their economic and political power to address such environmental injustices and is compounded by elephant damage they experience. Similar situations where poverty and biodiversity hotspots coincide often lead to unstable balances in coupled socioecological systems, where a lack of resources, institutions, and governance result in people unprepared for long-term natural resource management (Barrett et al. 2011).

The limited agency of our respondents to mitigate HECs translates into a lack of control over their own environments, signaling an environmental justice issue (Arcury et al. 2002). The HECs in Sabah highlight villagers' incapacity to cope with HECs under the state's *pro se quisque* approach to HECs. Our findings suggest that imbalanced economic resources first and foremost produced inequities associated with elephant damage. With ample resources at their disposal, industrial oil palm producers are able to cope with HECs and rural villagers less so (Estes et al. 2012; Othman et al. 2013,

2019). The agency, or capacity of stakeholders to modify their situations, plays a significant role in how they have responded to HECs (Jepson et al. 2011, Nyirenda et al. 2018), aligning HECs with other environmental injustices (Grineski 2009, Bell and Braun 2010, Lowman et al. 2013). Financial resources are critical to stakeholders' abilities to act on and defer their own elephant-based NIMBY claims in Sabah, whereas villagers without sufficient funds cannot handle HECs on their own. Inherently, deferring 1 group's NIMBY claim transfers the effects of inequality onto another group (Whyte 2010). Smallholders attempt to invoke their own NIMBY claims, but their limited agency (due to their demonstrated limited economic and political resources) prevents meaningful reconciliation to injustices. This relationship between a lack of agency and inferior, stagnant situations for communities is well documented in the environmental justice literature (Grineski 2009, Lowman et al. 2013). Moreover, our results suggest that deferring the problem is emboldening and habituating elephants and intensifying injustice. Injustice, described here as social norm, is not a formula for coexistence.

The formal institutions developed to address HECs in Sabah are in and of themselves not enough to mitigate HECs because they suffer from legitimacy deficits. Formal institutions enacted by government officials perceived as indolent, disinterested in citizens' problems, or unhelpful are generally unsuccessful at solving environmental justice problems (Lowman et al. 2013). The literature is replete with evidence of the importance of institutional legitimacy to charismatic megafauna conservation, and legitimacy deficits have been cited as reasons conservation efforts have struggled (Sandström and Pellikka 2008, Serenari and Taub 2019). In Sabah and elsewhere, bans on killing problem elephants appear ineffective (Nyirenda et al. 2015), and the absence of a universal damage compensation scheme is simultaneously laudable (Saif et al. 2019) and problematic (Schnegg and Kiaka 2018). Our results suggest that the state's underdeveloped HEC institutions places villagers in a tenuous position of self-reliance. This state of affairs is compounded by villagers who often hold 1-dimensional livelihoods, often going all in on palm despite the risks. This aspect of village life in Sabah may explain the desire to

assign a monetary value to elephants as well as help explain why villagers are bereft of agency. In sum, our findings on institutions suggest that the Sabah Wildlife Department must find innovative ways to unfetter smallholders from the perceived burden of living with elephants. If HEC governance is to be successful and sustainable, smallholders need to find legitimacy in SWD's exercises of power (e.g., bans on killing elephants, self-proclaimed role as an effective wildlife authority; Stoker 1998).

Informal institutions signaled hope for an equitable outcome in Sabah through culture, specifically collective action, shared intrinsic value, respect, empathy, and kinship ties. Societies have successfully appealed to cultural elements to coexist with elephants (Gogoi 2018, Saif et al. 2019). In the sketched principles for coexistence presented here, respondents appear to have divulged a role for tradition in mitigating HECs, contrasting previous findings suggesting a diminished role for culture in Malaysia (Ponnusamy et al. 2016, Othman et al. 2019). With no attempt to romanticize local environmental histories, we reference *tagal*, specifically, a Malay worldview of how to live a balanced life within the river ecosystem of Sabah and also appease the spiritual realm. Given that HECs are a relatively new phenomenon for these villages, our results suggest that *tagal* may explain why tolerance has not run dry for those willing to see what the future holds. We detect an urgency to the HEC matter, however, as we provide evidence that patience is indeed wearing thin. Our data signaled that informal institutions are being tested with insinuations of (1) tensions between tradition and the realities of living with elephants, (2) divergent values and shifting and nullified beliefs about the meaning and value of elephants in rural society, and (3) the processes of modernity and late-capitalist transformation that are infiltrating rural Malay societies (Kahn 2001). These shifts in informal institutions have implications for potential HEC solutions, particularly desired or proposed compensation schemes. When cultural ties to elephants are strong, compensation schemes to offset the monetary costs of damage may not be effective in improving tolerance toward elephants (Saif et al. 2019). However, in Sabah, where cultural bonds may not be as robust, compensation may prove helpful. Currently, the tense atmosphere

of human–elephant interactions is unsustainable given that elephant survival depends on human tolerance, and increased HECs erode the tenuous cultural values that bolster tolerance in the area (Suba et al. 2017, Saif et al. 2019).

Symptoms of environmental injustices appear to be consistent in the qualitative literature, and the effects of injustice are often reported as shifts in cognitive well-being—in this case, placing a heavy burden upon individuals to involuntarily carry the weight of endangered species protection. Smallholder cognitions identified in this study parallel those found in other instances of environmental injustice, and such emotional stresses can lead to impacts on health and quality of life (Lowman et al. 2013). For instance, frustration, despair, and fear were commonly voiced among our respondents, akin to the feelings of fear and psychological trauma expressed by Appalachian coalfield activists as a result of the flooding caused by mountaintop removal (Bell and Braun 2010) or the frustration and anxiety felt by rural residents neighboring large farms that apply potentially contaminated sewage sludge to their lands (Lowman et al. 2013). Documenting smallholders' experiences in this way gives voice to their experience so that they may be incorporated into conversations about viable HEC policy alternatives.

Solving human–elephant conflicts in Borneo and beyond

Utilizing Pellow's (2004) framework allows for a more holistic understanding of HECs in Sabah. Contextualizing HECs within sociohistorical processes and purposefully highlighting the agency of smallholders generates ideas on how stakeholders can get involved to promote coexistence. For example, adaptive capacity building can improve agency and diminish feelings of helplessness (Arcury et al. 2002), such as, at a minimum, providing smallholders with accessible information about how to handle human–elephant interactions. Evidence suggests providing information and knowledge can augment self-efficacy and perceptions of control (Arcury et al. 2002).

Eventually, sufficient levels of other valuable HEC resources will need to be provided to further increase smallholder self-efficacy and perceived control. For instance, wildlife tourism has been recommended as a potential

fix. Indeed, estates and smallholder communities could cooperatively manage for elephants by removing fences and embracing tourism, although future research to ensure viability is needed (Othman et al. 2019). Smallholders already recognize the potential touristic value of elephants, but they do not have a way to personally harness it. Sabah could adapt and learn from the community-based models (e.g., Schnegg and Kiaka 2018) where both costs (e.g., crop damage expenses) could be minimized if not eliminated, and benefits (e.g., tourism revenue; agency, local capacity, and self-reliance [Jackson and Wangchuk 2001]) could be maximized. Through self-organization, education, and empowerment, smallholders in Sabah can be successful in improving the practices, policies, and conditions that have unfairly impacted their communities (Bullard and Johnson 2000).

As villages are scattered across a vast monoculture landscape, it is clear that landscape-scale land use planning is critical. Oil palm monoculture landscape presents new challenges for stakeholders and elephants, inviting HECs (Fernando et al. 2005, Suba et al. 2017). Although plantations are successfully using deterrents such as electric fences to minimize elephant presence, they are subsequently reducing the amount of land available for elephant populations (Estes et al. 2012; Othman et al. 2013, 2019). With few viable pathways to travel, elephants move into neighboring smallholder farmlands where they find temporary suitable habitat, often leaving damage villagers cannot afford to experience (Othman et al. 2013, Suba et al. 2017, Othman et al. 2019). Designing viable agroforest strategies that encourage coexistence (e.g., fencing off only young oil palms; Othman et al. 2019) and reduce inequities for rural peoples is vital to mitigating HECs.

Our documentation of HECs in Sabah complements the extensive literature available on human–elephant interactions in other geographic settings. Negative human–elephant interactions detailed in our results (e.g., crop and property damage, threats to personal safety, and psychological stress) are well documented throughout Asia and Africa (Fernando et al. 2005, Ogra 2008, Ponnusamy et al. 2016, Suba et al. 2017, Gogoi 2018, Nyirenda et al. 2018, Joshi and Puri 2019, Saif et al. 2019). Traditional mitigation strategies, such as using

fire or banging cans to drive off elephants, were also reported as generally ineffective (Nyirenda et al. 2018). Akin to our findings, many communities rely heavily on communal efforts to collectively drive elephants away, which is more effective than individual efforts (Fernando et al. 2005, Nyirenda et al. 2018). In locations such as India (Gogoi 2018) and Bangladesh (Saif et al. 2019), parallels can be made to our research regarding the cultural significance of elephants as a mitigating force against intolerance. Across these studies, the cultural role of elephants is also linked to anthropomorphism, prompting feelings of empathy (Gogoi 2018, Saif et al. 2019). Divergent from these studies, however, our research provides clear links between HECs and environmental justice.

Our research contributes to ongoing conversations focusing on the vast underlying aspects of the "human" component of "human–wildlife conflict" (HWC; Messmer 2000). Research exploring human–wildlife interactions has evolved from examining HWCs as isolated events affecting only people's livelihoods (e.g., farming), to delving into how HWCs influence people's economic, social, and cultural lives (Messmer 2000, Hill 2015). As such, mitigation interventions have since included stakeholders' perspectives, concerns, priorities, and understandings of HWCs. Indeed, research has expanded to include ideas such as hidden costs, which highlight the uncompensated, delayed, and/or psychosocial harms people experience from human–wildlife interactions (Ogra 2008, Doubleday 2020). However, as Hill (2015) notes, while technical interventions that reduce the direct impact of wildlife on livelihoods are necessary for short-term resolution, affecting successful, long-term change requires significant engagement with underlying social issues. By using an environmental justice lens to examine HECs (and human–wildlife interactions more generally), we are compelled to acknowledge and address the latent, fundamental social problems causing HEC symptoms. We focused on distributional injustices because of the themes that emerged from our analysis of the interviews, but future research that incorporates other aspects of environmental injustices such as recognition and procedural justice would be valuable (e.g., Schnegg and Kiaka 2018). Like many qualitative studies, limitations of our

research include a small sample size of villagers and villages. However, we focused on key players and villages most impacted by HECs. The results are generalizable to these villages and should not be used to make inferences for the larger population (Berg 2001).

Conclusion

This exploratory research is the beginning of a long road to coexistence between smallholders, oil palm producers, and the state of Sabah. Human–elephant conflicts continue to undermine conservation efforts and prove to be a constant challenge for coexistence outside of protected areas. Sabah's experience is not unlike HECs in other settings and universal endangered species plights in other parts of the world. Our documentation of elephant conservation as a NIMBY claim by smallholders in Sabah serves as a marker of potential environmental injustice, which we explored using Pellow's (2004) environmental justice framework. By framing HECs as an environmental injustice, we were able to delve into the social and historical processes at play, in addition to problematic human–elephant interactions, and recommend potential solutions that improve stakeholder agency and their ability to achieve justice.

Acknowledgments

Literature cited

Alfred, R., A. H. Ahmad, J. Payne, C. Williams, L. N. Ambu, P. M. How, and B. Goossens. 2012. Home range and ranging behaviour of Bornean elephant (*Elephas maximus borneensis*) females. PLOS ONE 7(2): e31400.

Arcury, T. A., S. A. Quandt, and G. B. Russell. 2002. Pesticide safety among farmworkers: perceived risk and perceived control as factors reflecting environmental justice. Environmental Health Perspectives 110:233–240.

Barrett, C. B., A. J. Travis, and P. Dasgupta. 2011. On biodiversity conservation and poverty traps. Proceedings of the National Academy of Sci-

ences 108:13907–13912.

Beebe, J. 2001. Rapid assessment process: an introduction. AltaMira Press, Walnut Creek, California, USA.

Bell, S. E., and Y. A. Braun. 2010. Coal, identity, and the gendering of environmental justice activism in central Appalachia. Gender & Society 24:794–813.

Berg, B. L. 2001. Qualitative research methods for the social sciences. Fourth edition. Allyn and Bacon, Boston, Massachusetts, USA.

Biernacki, P., and D. Waldorf. 1981. Snowball sampling: problems and techniques of chain referral sampling. Sociological Methods & Research 10:141–163.

Bose, S. 2004. Positioning women within the environmental justice framework: a case from the mining sector. Gender, Technology and Development 8:407–412.

Bullard, R. D., and G. S. Johnson. 2000. Environmentalism and public policy: environmental justice: grassroots activism and its impact on public policy decision making. Journal of Social Issues 56:555–578.

Cock, J., and D. Fig. 2000. From colonial to community based conservation: environmental justice and the national parks of South Africa. Society in Transition 31:22–35.

Dahlberg, A., R. Rohde, and K. Sandell. 2010. National parks and environmental justice: comparing access rights and ideological legacies in three countries. Conservation and Society 8:209–224.

Doubleday, K. F. 2020. Tigers and "good Indian wives": feminist political ecology exposing the gender-based violence of human–wildlife conflict in Rajasthan, India. Annals of the American Association of Geographers 110(5):1–19.

Estes, J. G., N. Othman, S. Ismail, M. Ancrenaz, B. Goossens, L. N. Ambu, A. B. Estes, and P. A. Palmiotto. 2012. Quantity and configuration of available elephant habitat and related conservation concerns in the Lower Kinabatangan floodplain of Sabah, Malaysia. PLOS ONE 7(10): e44601.

Faber, D. R., and D. McCarthy. 2003. Neo-liberalism, globalization and the struggle for ecological democracy: linking sustainability and environmental justice. Pages 55–80 *in* R. D. Bullard, J. Agyeman, and B. Evans, editors. Just sustainabilities: development in an unequal world. Earthscan Publications, London, United Kingdom.

Fast, S. 2009. The biofuels debate: searching for the role of environmental justice in environmental discourse. Environments: A Journal of Interdisciplinary Studies 37:83–100.

Feldman, S., and D. Turner. 2010. Why not NIMBY? Ethics, Place & Environment 13:251–266.

Feldman, S., and D. Turner. 2014. Why not NIMBY? Ethics, Policy & Environment 17:105–115.

Fernando, P., E. Wikramanayake, D. Weerakoon, L. K. A. Jayasinghe, M. Gunawardene, and H. K. Janaka. 2005. Perceptions and patterns of human–elephant conflict in old and new settlements in Sri Lanka: insights for mitigation and management. Biodiversity and Conservation 14:2465–2481.

Fusch, P. I., and L. R. Ness. 2015. Are we there yet? Data saturation in qualitative research. The Qualitative Report 20:1408.

Grineski, S. E. 2009. Human–environment interactions and environmental justice: how do diverse parents of asthmatic children minimize hazards? Society and Natural Resources 22:727–743.

Gogoi, M. 2018. Emotional coping among communities affected by wildlife-caused damage in north-east India: opportunities for building tolerance and improving conservation outcomes. Oryx 52:214–219.

Hamazaki, T., and D. Tanno. 2002 Totemization of wildlife and NIMBY among U.S. college students. Human Dimensions of Wildlife 7:107–121.

Hill, C. M. 2015. Perspectives of "conflict" at the wildlife–agriculture boundary: 10 years on. Human Dimensions of Wildlife 20:296–301.

Imperial, M. T. 1999. Environmental justice and water pollution control: the Clean Water Act Construction Grants program. Public Works Management & Policy 4:100–118.

Jackson, R., and R. Wangchuk. 2001. Linking snow leopard conservation and people–wildlife conflict resolution: grassroots measures to protect the endangered snow leopard from herder retribution. Endangered Species Update 18:138–141.

Jacobs, M. H. 2012. Human emotions toward wildlife. Human Dimensions of Wildlife 17:1–3.

Jepson, P., M. Barua, and K. Buckingham. 2011. What is a conservation actor? Conservation and Society 9:229–235.

Jerrett, M., R. T. Burnett, P. Kanaroglou, J. Eyles, N. Finkelstein, C. Giovis, and J. R. Brook. 2001. A GIS–environmental justice analysis of particulate air pollution in Hamilton, Canada. Environment and Planning A: Economy and Space 33:955–973.

Joshi, R., and K. Puri. 2019. Train–elephant collisions in a biodiversity-rich landscape: a case study from Rajaji National Park, North India. Human–Wildlife Interactions 13:370–381.

Kahn, J. 2001. Anthropology and modernity. Current Anthropology 42:651–680.

Kioko, J., P. Muruthi, P. Omondi, and P. I. Chiyo. 2008. The performance of electric fences as elephant barriers in Amboseli, Kenya. African Journal of Wildlife Research 38:52–58.

Lowman, A., M. A. McDonald, S. Wing, and N. Muhammad. 2013. Land application of treated sewage sludge: community health and environmental justice. Environmental Health Perspectives 121:537–542.

Marin, G., and B. V. Marin. 1991. Research with Hispanic populations. Sage, Newbury Park, California, USA.

McAfee, K. 1999. Selling nature to save it? Biodiversity and green developmentalism. Environment and Planning D: Society and Space 17:133–154.

McCarthy, J. F. 2010. Processes of inclusion and adverse incorporation: oil palm and agrarian change in Sumatra, Indonesia. Journal of Peasant Studies 37:821–850.

McGurty, E. 2009. Transforming environmentalism: Warren County, PCBs, and the origins of environmental justice. Rutgers University Press, Piscataway, New Jersey, USA.

Mehta, L., J. Allouche, A. Nicol, and A. Walnycki. 2014. Global environmental justice and the right to water: the case of peri-urban Cochabamba and Delhi. Geoforum 54:158–166.

Messmer, T. A. 2000. The emergence of human–wildlife conflict management: turning challenges into opportunities. International Biodeterioration & Biodegradation 45:97–102.

Nyirenda, V. R., P. A. Lindsey, E. Phiri, I. Stevenson, C. Chomba, N. Namukonde, W. J. Myburgh, and B. K. Reilly. 2015. Trends in illegal killing of African elephants (*Loxodonta africana*) in the Luangwa and Zambezi ecosystems of Zambia. Environment and Natural Resources Research 5:24–36.

Nyirenda, V. R., B. A. Nkhata, O. Tembo, and S. Siamundele. 2018. Elephant crop damage: subsistence farmers' social vulnerability, livelihood sustainability and elephant conservation. Sustainability 10:3572.

Ogra, M. V. 2008. Human–wildlife conflict and

gender in protected area borderlands: a case study of costs, perceptions, and vulnerabilities from Uttarakhand (Uttaranchal), India. Geoforum 39:1408–1422.

Orsato, R. J., S. R. Clegg, and H. Falcão. 2013. The political ecology of palm oil production. Journal of Change Management 13:444–459.

Ostrom, E. 1998. A behavioral approach to the rational choice theory of collective action: presidential address, American Political Science Association, 1997. American Political Science Review 92:1–22.

Othman, N., P. Fernando, K. Yoganand, M. Ancrenaz, R. J. Alfred, S. Nathan, and B. Goossens. 2013. Elephant conservation and mitigation of human–elephant conflict in government of Malaysia-UNDP multiple-use forest landscapes project area in Sabah. Gajah 39:19–23.

Othman, N., B. Goossens, C. P. I. Cheah, S. Nathan, R. Bumpus, and M. Ancrenaz. 2019. Shift of paradigm needed towards improving human–elephant coexistence in monoculture landscapes in Sabah. International Zoo Yearbook 53:161–173.

Paloniemi, R., E. Apostolopoulou, J. Cent, D. Bormpoudakis, A. Scott, M. Grodzińska-Jurczak, J. Tzanopoulos, M. Koivulehto, A. Pietrzyk-Kaszyńska, and J. D. Pantis. 2015. Public participation and environmental justice in biodiversity governance in Finland, Greece, Poland and the UK. Environmental Policy and Governance 25:330–342.

Pellow, D. N. 2004. The politics of illegal dumping: an environmental justice framework. Qualitative Sociology 27:511–525.

Ponnusamy, V., P. Chackrapani, T. W. Lim, S. Saaban, and A. Campos-Arceiz. 2016. Farmers' perceptions and attitudes towards government-constructed electric fences in Peninsular Malaysia. Gajah 45:4–11.

Pye, O. 2010. The biofuel connection–transnational activism and the palm oil boom. Journal of Peasant Studies 37:851–874.

Rowan, G. T., and C. Fridgen. 2003. Brownfields and environmental justice: the threats and challenges of contamination. Environmental Practice 5:58–61.

Saif, O., R. Kansky, A. Palash, M. Kidd, and A. T. Knight. 2019. Costs of coexistence: understanding the drivers of tolerance towards Asian elephants *Elephas maximus* in rural Bangladesh. Oryx 54:603–611.

Sandström, C., and J. Pellikka. 2008. Large carnivore management in a multi-level institutional setting: problems and prospects. Pages 1–18 *in* 12th Biennial Conference of the International Association for the Study of the Commons, Cheltenham, United Kingdom.

Schlosberg, D., and L. B. Collins. 2014. From environmental to climate justice: climate change and the discourse of environmental justice. Wiley Interdisciplinary Reviews: Climate Change 5:359–374.

Schnegg, M., and R. D. Kiaka. 2018. Subsidized elephants: community-based resource governance and environmental (in) justice in Namibia. Geoforum 93:105–115.

Schroeder, R. A. 2008. Environmental justice and the market: the politics of sharing wildlife revenues in Tanzania. Society and Natural Resources 21:583–596.

Schroeder, R., K. S. Martin, B. Wilson, and D. Sen. 2008. Third world environmental justice. Society and Natural Resources 21:547–555.

Serenari, C., and M. N. Peterson. 2016. A sociopolitical perspective on the illegal take of wildlife in the southeastern USA. International Journal of Rural Criminology 3:29–49.

Serenari, C., and M. Taub. 2019. Predicting the legitimacy of wolf recovery. Wildlife Biology 2019(1):1–12.

Stoker, G. 1998. Governance as theory: five propositions. International Social Science Journal 50:17–28.

Suba, R. B., J. V. D. Ploeg, M. V. T. Zelfde, Y. W. Lau, T. F. Wissingh, W. Kustiawan, G. R. de Snoo, and H. H. De Iongh. 2017. Rapid expansion of oil palm is leading to human–elephant conflicts in North Kalimantan province of Indonesia. Tropical Conservation Science 10:1940082917703508.

Taylor, D. E. 2000. The rise of the environmental justice paradigm: injustice framing and the social construction of environmental discourses. American Behavioral Scientist 43:508–580.

Thompson, C. 1999. Qualitative research into nurse decision making: factors for consideration in theoretical sampling. Qualitative Health Research 9:815–828.

Urkidi, L., and M. Walter. 2011. Dimensions of environmental justice in anti-gold mining movements in Latin America. Geoforum 42:683–695.

von Essen, E., and M. Allen. 2020. "Not the wolf itself": distinguishing hunters' criticisms of wolves from procedures for making wolf man-

agement decisions. Ethics, Policy & Environment 23:97–113.

Whyte, K. P. 2010. Why not environmental injustice? Ethics, Place & Environment 13:333–336.

Wilcove, D. S., and L. P. Koh. 2010. Addressing the threats to biodiversity from oil-palm agriculture. Biodiversity and Conservation 19:999–1007.

Wintle, B. A., S. A. Bekessy, D. A. Keith, B. W. van Wilgen, M. Cabeza, B. Schröder, S. B. Carvalho, A. Falcucci, L. Maiorano, T. J. Regan, C. Rondinini, L. Boitani, and H. P. Possingham. 2011. Ecological–economic optimization of biodiversity conservation under climate change. Nature Climate Change 1:355–359.
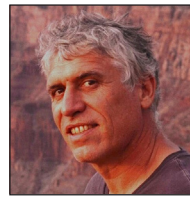
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Appendix 1. Interview guide consisting of questions about respondents' experience with and knowledge of elephant (*Elephas maximus borneensis*) interactions in their community, how they managed these interactions and the perceived efficacy of their management, and their perceptions of elephant conservation in Sabah, Malaysia.

Interview guide

ID:

Location:

Telephone number:

Serial number:

Gender:

Age:

Household members:

Source of income (occupation):

Race:

Length of live/stay in the community:

Education:

Total income:

Interviewed by:

Date:

Q1: Please tell us how you manage your land?
Probe. By yourself? With help?

Q2: Please tell me about your interactions with elephants? Positive? Negative?
Probe. Have you noticed changes in interactions over time?

Q3: What factors do you think influence human interactions with elephants?
Probe. Individual humans, individual elephants, village/community, state, global, ecological, spiritual, etc.?

Q4: Do elephants pose a threat to you?
Probe. To your family? Livestock? Livelihood? Neighbors?

Q5: Which animals cause the most problems for you? On a scale of 1 to 5, 5 being the worst, how would you compare elephants as a problem compared to other animals that cause damage?

Q6: Who owns the elephants? (Sabah Wildlife Department, God, etc.?)

Q7: What value do elephants have for you? Why?
Probe. Economic, spiritual, etc.?

Q8: Do you agree that elephants should be protected from extinction?

Q9: How have you responded to the presence of elephants?

Q9(a): Strategies undertaken or rules put in place (formal, informal)?

Q10: How effective have (individual/village/state) responses or rules been?
Probe. Why do you think they are/not effective?

Q11: If you could change what you do to defend your property and family, what would you change?

Q11(a): Why?

Q11(b): Would you consider changing the crops you grow? Different preventive measures?

Q12: Under what conditions would you consider sharing the landscape with elephants?