

One Stable's Novel Approach to Mitigating Human-Elephant Conflict Near Chitwan National Park, Nepal

Michelle Szydlowski

University of Exeter, EASE Working Group, Exeter, UK

Author's e-mail: michelle@szyd.me

Abstract. Human-elephant conflict in the areas surrounding Chitwan National Park, Nepal, remains a concern. A unique cause of such conflict is the incursion of wild bull elephants into human-dominated landscapes in search of female elephants. One elephant owner adopted a novel method to mitigate conflict arising from such incursions by housing a female and her offspring within the community forest protected area. While this eliminated male incursion into human-dominated areas, it had to be abandoned after eight months, as authorities did not permit it.

Introduction

Human-elephant conflict is a concern throughout Asian elephant (*Elephas maximus*) ranges, and inequitably affects landless or otherwise disadvantaged community members (Acharya *et al.* 2016; Lamichhane *et al.* 2018). Near Chitwan National Park, Nepal, many such conflicts are due to rapid human population growth in elephant ranges which results in the narrowing of natural migratory corridors. Villages which lie within national park 'buffer zones' (areas surrounding national parks, set aside for local use to prevent overconsumption of park resources) are most heavily affected, due to their proximity to protected areas and the community's reliance upon agriculture for survival. These buffer zones house marginalized communities, which bear a burden from human-elephant conflict (HEC) (Acharya *et al.* 2016; Lamichhane *et al.* 2018).

Conflicts arise when wild elephants are attracted to water sources or human-cultivated crops (Yadav *et al.* 2014). Agricultural crops offer higher palatability and greater nutritional or mineral content than wild-growing flora (Pokharel *et al.* 2018). Crop raiding also occurs when herds simply 'happen across' agricultural lands during regular movement, with fields lying alongside protected areas offering easy accessibility (Sukumar 2003; Yadav *et al.* 2014). These incursions may result in the destruction

of croplands, fencing or housing, and injuries or fatalities to humans (Sukumar 2003). Within the buffer zones of Chitwan National Park, for example, wild elephants have caused more than 26 human fatalities, 30 injuries, and damaged over 300 homes over the last 20 years (Lamichhane *et al.* 2018). In response, elephants face retributory injury or death (Yadav *et al.* 2014).

A little studied contributor to HEC may be the presence of captive female elephants in residential or touristic areas, which attracts wild bulls. For example, a bull elephant was documented following a captive female into one of Nepal's buffer zone villages (Pant *et al.* 2016). Bulls in musth actively seek out females for mating (but are believed to remain with the herd only if females are in estrus), but non-musth bulls are thought to remain solitary or travel in male-only herds (Sukumar 2003; Srinivasaiah *et al.* 2019). In African elephants (*Loxodonta africana*) and Asian elephants, males exhibit short term, non-musth association with female groups (Evans & Harris 2008; Srinivasaiah *et al.* 2019; Keerthipriya *et al.* 2020, Madsen *et al.* 2022). These interactions are often related to the overlap of ranges, watering holes, forest cover (Fernando *et al.* 2008; Fishlock & Lee 2013) or loose associations with family herds during adolescence and dispersal (Sukumar 2003).

Documentation of longer-term association of adult males with non-cycling females is lacking.

However, according to interlocutors in an ongoing study (including mahouts, owners, foreign veterinary personnel and veterinary medical staff from the Nepalese government and the National Trust for Nature Conservation), wild bull association with non-cycling captive females is commonly seen in the hattisars (elephant stables) surrounding Chitwan National Park. Interlocutors reported that wild bulls spend extended time in both governmental and private hattisars. While some visits of males could be attributed to the proximity of food or water storage near stables (Lenin & Sukumar 2011), others lacked clear explanation.

One reason for association of wild bulls with captive females may be due to traditional practices aimed at encouraging captive elephant reproduction. Government-owned breeding facilities rely upon wild bulls to impregnate captive females, often chaining cycling females just beyond the stable perimeter to prevent escape and make them ‘more accessible’ (Varma & Ganguly 2011; Gairhe 2012). Captive-wild pairings have been the primary method of government-owned elephant reproduction in Nepal for decades, in part due to the difficulty of managing male elephants in captivity (Varma & Ganguly 2011). Therefore, encouraging incursions by wild bulls is traditional practice within governmental breeding facilities (Gairhe 2012; GoN 2015).

While the practice of stabling captive females near protected areas (PAs) has resulted in births among government owned elephants, it may also have resulted in the habituation of wild bulls to human activity and may be responsible for increasing HEC (Gairhe 2012; Pant *et al.* 2016). While electric fences, fires, noisemaking, and the planting of unpalatable crops have been employed to prevent wild elephant incursions onto human-occupied lands surrounding the park, they have had little success (Yadav *et al.* 2014; Acharya *et al.* 2016). In many cases, attempts by humans to dissuade elephants from entering settlements has backfired, with numbers of fatalities increasing as humans attempted to drive off elephants with loud noises, bright lights, or firecrackers (Ram *et al.* 2021). Privately-owned female elephants have not experienced a similar reproduction rate from wild

bull incursions, with only three successful births in the past two decades (Gairhe 2012).

Wild bulls may also ‘release’ captive elephants from their stables, chasing or leading them into the jungle. These escapes force mahouts to follow on foot into protected areas, locate, and recapture the females (Varma & Ganguly 2011; Szydlowski 2021). Such releases and subsequent searches are dangerous both for the captive female, who has little experience with life outside the stable, and her mahouts, who face casualties from wildlife living within or near PAs. In fact, an average of 9.3 annual human fatalities occur within the PAs near Chitwan National Park, and mahouts on foot are at a much higher risk (Lamichhane *et al.* 2018; Rimal 2020; Mandal 2021).

Methodology

This case study is part of an ongoing project focused upon privately-owned elephants and their mahouts housed in villages adjacent to Chitwan National Park. These teams provide elephant-backed safari for tourists through the buffer zones of the national park (see below). Data were collected through a series of semi-structured face to face interviews with individual elephant owners, members of the United Elephant Owners’ Cooperative, mahouts, community members, and I/NGO staff from the Jane Goodall Institute-Nepal and the National Trust for Nature Conservation, participant observations (of elephants, owners, and mahouts), and interviews via phone, email, and messaging applications from 2019–2022. Photographic evidence of wild-captive elephant interactions was obtained from mahouts, owners, and other community members. This study is part of a larger project which was granted ethics approval by the University of Exeter College of Social Science and International Studies Ethics Committee.

Study area

This study took place on the edge of the Kumroj Community Forest (CF), in the Khairhani municipality of the Chitwan district in southern Nepal. Kumroj CF is located just north of the central area of Chitwan National Park, and

southeast of the park's main entry point of Sauraha (Figs. 1 & 2).

Chitwan National Park is surrounded by buffer zones (Fig. 2). Tourist safaris are not allowed to operate within the boundaries of CNP, nor are privately owned elephants allowed to enter or graze within the national park. Instead, elephant-backed tourist safaris travel through the first of the buffer zones, the conservation zone, which serves as an extension of the national park and is managed by government agencies. This buffer zone area can only be used for governmentally regulated tourist activities, and the removal of forest products is severely restricted. Fees from conservation zone safaris are split between the government and elephant owners.

The next buffer area, the sustainable-use zone, is managed by local populations and used for community-based tourism practices, including additional elephant-backed safaris (which uses the same group of elephants as in conservation zone activities). These safari fees, however, are split between community forest users' groups and elephant owners. The use of the forest and forest products in this zone is controlled by local households. Some mahouts have permission to enter the Kumroj community forest for grass cutting, but private elephant owners are forbidden from housing their elephants within the national park or any of its buffer zones (GoN 2015). As community forests are locally governed, some user-groups have recently begun granting fee-based access to non-residents for grazing.

Case study

In January 2022, a wild bull, Govinda Gaj, repeatedly broke through the barrier fence separating the Kumroj community forest from human neighborhoods. Govinda, according to interlocutors, was attracted to a 25-year-old captive female ('Dira Kali') being housed in a hatisar located approximately 100 yards from the barrier fence. The female was housed with her offspring, consisting of two females (~9 and 12 years old) and a one-year-old male. The wild bull and captive female are said to share a history; Govinda regularly visited Dira's former stable near the Meghauri community forest, and



Figure 1. Nepal outline showing location of Chitwan National Park (red arrow) (GoN 2015).

sired Dira's youngest calf. This calf is unique, as wild bull pairings with privately owned females are rarely successful in producing offspring (Kharel 2002).

The female and offspring were purchased in 2019 by an owner who has been keeping tourist-backed safari elephants in Sauraha for a decade. He relocated all eight of his elephants to the rural Kumroj area in 2020 to reduce their daily commute to the tourist safari gates, and to escape the noise and traffic which surrounded his old stable. In Kumroj, the herd was housed in larger, chain-free corrals. Mahout housing was available near each, which helped maintain close contact with elephants and helped build positive human-elephant bonds. Such bonds have been shown to improve handler satisfaction as well as improve elephant health and welfare (Desai 2008; Carlstead *et al.* 2019; Kontogeorgopoulos 2020).

Ongoing conflicts

In January 2022, Govinda began regularly crossing through neighborhoods and farmlands

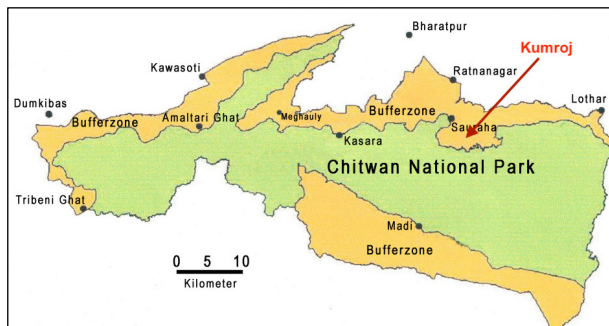


Figure 2. Map of Chitwan National Park (green), its buffer zones (yellow) and the study site (Kumroj). By Bhagya Mani, used under creative commons license.

to reach the private hattisar, and neighbors became concerned about crop loss, housing damage, and their physical safety. The bull repeatedly broke sections of the forest barrier fence, which is intended to keep non-local humans out of the buffer zone and potentially dangerous wildlife within. Later that month, Govinda ‘released’ the family herd from their corral and mahouts followed on foot hoping to recapture them. While the mahouts were able to locate the herd, Govinda showed no signs of moving off. In the hope of protecting his mahouts while assuaging the fears of his neighbors and minimizing damage to their crops and homes, the owner allowed the herd to remain within the buffer zone near the wild bull. The owner and several mahouts continued to follow the family group, and the herd eventually settled near an observation tower two km from the boundary of the PA. This structure, located on the border between the community forest and the national park, offered safety for the mahouts when Govinda became defensive or curious, and for staff to spend their nights.

The elephant-human group stayed in the community forest for six months with few issues. Eight mahouts continued to care for the elephants, making kushis (rice and molasses wrapped in grass), observing the herd, carrying water, and taking turns returning to the hattisar for supplies and rest. They continued to split shifts, allowing them to rest or return to their family’s village for visits. Govinda and the family herd spent time trunk-wrestling, group browsing, resting, and he was seen ‘playing’ with the calf. Rather than exhibiting signs of anxiety or disrupted sleep patterns, which would be expected following a change in herd structure and daily schedule (Evison *et al.* 2020), the elephants instead began to lie down en masse at night. Group sleep indicates a high level of herd cohesion and decreased stress (Evison *et al.* 2020). Being allowed to spend the night within ‘more natural settings,’ such as jungle, has also been documented to lower levels of stress hormones in captive individuals (Banshiddhi *et al.* 2020).

After six months, another wild bull, Ronaldo, began to approach, fought with and eventually

chased Govinda off. Ronaldo led the family to another part of the PA (or possibly to the interior of the national park, the mahouts were unsure), and mahouts were unable to locate them for eight weeks. Renaldo finally moved off, and mahouts found and relocated the family to the watch tower, where they remained for two more months until forced to leave by authorities in September. While this elephant owner had been granted access for grazing within the community forest, the government prohibits keeping elephants within the PA.

No property damage occurred in the village during their tenure in the jungle; neighborhood complaints stopped, and there were no injuries to humans or elephants. Other unintended benefits of the jungle ‘occupation’ were reported. For example, participants in jeep safaris (which take place within the PA) thought they were viewing wild elephants rather than a captive herd (even though the captive females had neck ropes). Ability to see elephants is a major selling point for the government and tourism providers. While solitary males are sometimes seen in the PAs near town, spotting a herd typically requires an all-day walk into the jungle. Due to the low number (fewer than 200) of wild elephants left in Nepal (Yadav *et al.* 2014), sighting wild individuals is rare. Having this family ‘loose in the jungle’ offered tourists the opportunity to see elephants and observe natural herd behaviors.

Lastly, mahouts reported that the elephants were ‘happier’ when allowed to freely roam during their time in the forest, eat when desired, and socialize with wild males. Mahouts felt that while their elephants ‘loved’ and ‘needed’ them, the elephants exhibited more signs of happiness when removed from chains and allowed extended time away from safari duties in which to rest, eat, and spend time with ‘family’. The mahouts, while describing that it is ‘more dangerous’ to be near male elephants, likely also benefitted from the decreased need to keep their elephants under tight control. This control is necessary for the safety of mahouts and tourists on safari, and a break from safari work can lower mahout and elephant stress (Szydlowski 2022).

Discussion

This case study provided insight into the potential danger of housing captive females near wild bull ranges and highlighted a novel solution for decreasing incursions by males into human croplands or villages. Various efforts (tusk trimming, aversion with fire, patrols) have failed to mitigate conflict between humans and the wild males whose ranges include the Kumroj forest area. However, during the time Govinda and the captive herd were socializing within the forest, neighbors reported zero conflicts with bulls. While this could be considered a success for preventing HEC in Kumroj, further quantitative studies are needed to assess reductions in conflict over time and in other areas.

The case also highlights ways in which elephant well-being might be increased through access to the community forest. Having greater agency to decide when and where to eat, rest, or walk has been shown to increase elephant welfare (Kagan *et al.* 2015). An increase in elephant happiness may be due to the increased availability of food within the PA. Fodder supply issues are common in Nepal, due to the lack of available space to graze outside PAs, and the low availability of browse items for collection, especially during the winter months. While a few owners have garnered fee-based access to the community forest, most elephant owners are not allowed to enter forests for fodder collection or grazing. Local elephant owners have long sought access to buffer zones, including community forests, but have been unable to come to an agreement with users' groups or government agencies. Several have drafted plans which would allow elephant stables to be relocated within the buffer zones, but such collaborative projects have yet to materialize. If community forest users' groups and elephant owners can come to an agreement on access rights, then perhaps use of the forest can serve to reduce incursions by bulls into populated areas, increase the variety of fodder for captive individuals, and allow for tourist viewing of elephants in natural settings without the need to venture deeper into protected areas. Of course, such access rights must consider the needs of all residents of the community forest, lest they further marginalize groups of humans or other animals (Campbell

2007). Allowing more access for female elephants to protected areas may keep wild bulls out of more populous areas, while also placing marginalized human populations (those reliant upon the community forest for survival provisioning) at greater risk (Acharya *et al.* 2016; Lamichhane *et al.* 2018). Likewise, increasing human access to these areas might result in habituation by resident wildlife or movement of wildlife away from protected areas, increasing their risk (Curry *et al.* 2001; Geffroy *et al.* 2015). A consideration of greater passage of transmissible disease should also be considered, as Nepal faces increasing numbers of fatalities among wildlife which are likely due to disease passage along the captive-wild interface (Szydlowski 2022).

While this owner allowed his herd and mahouts to follow a bull elephant into the jungle to pacify and protect his neighbors, this novel approach might provide simple solutions to ongoing problems within Nepal. Due to the lack of appropriate grazing lands outside of PAs, lack of access to large plots of land for stabling, and inability to collect a wide variety of plant materials for provisioned feeding, mahouts and elephants in private stables face daily challenges.

While allowing his herd to reside within protected areas is still illegal (and potentially dangerous for mahouts), the experiences of this captive herd offer novel insight into possible future options for reducing bull elephant entry into villages. Semi-wild elephant management has proven successful in other SE Asian countries and could offer options within Nepal which might decrease wild elephant damage to residential areas. Of course, any wild-captive elephant interactions within Nepal must be considered carefully, as disease spread along this interface is of increasing concern for wild populations.

Likewise, the practice of keeping female elephants near residential areas may need to be reconsidered in light of ongoing incursions by wild males, especially if these incursions occur even when captive females are not in estrus. Private stables, and the breeding center, may need to be relocated to less populous areas as human density continues to increase in buffer zones.

Likewise, limiting human expansion along elephant migratory routes is important.

If this owner is successful in continuing to bring in tourist dollars while improving elephant welfare, perhaps other owners will embrace these approaches to husbandry practices. Increasing stable footprints, allowing for longer and more varied consumption times, permitting access to conspecifics, and allowing agency for captive elephants is key to increasing health and welfare. As these elephants share landscapes with ever-decreasing numbers of wild individuals, their health is key to ensuring both populations remain viable within Nepal.

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