

The Need for a One Health Approach to Human-Elephant Conflict

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WRITER'S COMMENT: I wrote this research paper for the general assignment of discussing a One Health issue. "One Health" refers to the perspective that human, animal, and environmental health are interconnected, and that these forms of health engage with factors like culture, politics, and economics. This provides an overall picture of health and the many dynamics with which it interacts. In choosing my topic, I decided to find a One Health problem involving human-wildlife conflict because it is a significant challenge for conservation, and I have professional interests in wildlife conservation. During my preliminary research, I came across an article on the "hidden costs" of human-wildlife conflict that piqued my interest, and after exploring the subject further, I realized that hidden costs are precisely suited to the interdisciplinary collaboration for which One Health advocates. However, no one had argued for using a One Health approach to address hidden costs. My paper makes that argument, and while I focused on human-elephant conflict in India, my arguments could be extrapolated to other examples of human-wildlife conflict.

INSTRUCTOR'S COMMENT: The guidelines for this research paper for my class: "One World One Health: Humans, Animals, Environment" were deliberately rather vague. The students were challenged to choose a topic of interest to them as long as it dealt with the complexity of One Health approaches in a comprehensive way. To do that they needed to consider the human medical, veterinary, and environmental aspects of their topic, add political economic analysis, and make

it clear how the topic engaged with the ideas behind One Health approaches in some meaningful way. Brittaney very soon identified a topic that managed to do this in a unique and creative way. Her focus on the human-elephant conflict in India covered all these topics and illustrated in a “real-life” conservation setting the benefits that often accrue to employing a One Health approach. Her research was comprehensive, her writing and argumentation excellent, and the overall paper, as you can plainly see here, was top rate. On top of that, she produced a beautiful and professional poster to present to the class with her abstract, and it was delivered with aplomb. I have the greatest confidence that Brittaney will apply her knowledge and skills well in the future and become a wonderful and well-rounded veterinarian with much to contribute to the challenges that lie ahead for us all.

– Diana Davis, Department of History

Abstract

Human-wildlife conflict (HWC) presents a serious threat to conservation success by embittering local people’s attitudes against conservation efforts and endangered species. As such, HWC receives due attention in devising conservation plans. Using human-elephant conflict (HEC) in India as a case study, this paper shows that while the visible and direct costs of HWC, such as crop raids, are commonly considered for mitigation, the “hidden costs” of HEC, such as decreased capacity to work or psychological trauma, are thusly named because they rarely receive the same attention or compensation. Yet, they represent some of the most damaging long-term effects of HEC, and marginalized peoples, particularly women, tend to bear these costs the most. HEC management strategies should take these hidden costs and vulnerabilities into account to better address an important cause of people’s opposition to conservation and to minimize undue burden on marginalized people. One way of doing this is by reevaluating current HEC management techniques from a One Health axis, i.e. considering the impact of those techniques on both human and elephant health. This ensures a balance

between maximizing use of efficacious strategies and reducing deleterious health consequences. Ultimately, a One Health perspective – for example, including input from and understanding of social, psychological, and health factors, in addition to ecological ones – is necessary for conservation globally, because this holistic approach would address the hidden costs of HWC that undermine conservation progress.

Introduction

Conservation is most successful when it has the support of the local community, but human-wildlife conflict (HWC) presents one of the biggest threats to such success by souring local people's attitudes towards the protected species, as well as towards conservationists themselves (Barua, Bhagat, & Jadhav, 2013). The reasons for this are understandable: oftentimes HWC takes the form of animal attacks, livestock predation, crop raiding, and other conflicts that directly threaten the lives and/or livelihoods of the people in question. This is especially an issue in Global South countries. In recognition of the severity of this problem, HWC receives due attention when devising conservation management and protection plans. However, while the impacts of HWC on animal and ecosystem health are generally well-documented and clearly apparent in HWC, unfortunately not all human effects of HWC are noticed by conservationists. They are aware of visible and direct costs of HWC, such as loss of harvest from crop raids, and seek to mitigate these damages through conflict management strategies like animal deterrence or collaboration with local government for compensation policies. Yet, there are other potentially even more important effects of HWC that often go unnoticed by conservationists, called "hidden costs," and these costs do not factor into their HWC management strategies. Moreover, some management strategies can even contribute to these unnoticed effects. Hidden costs include consequences like decreased capacity to work or psychological trauma, and ironically, it is hidden costs that may present the most damaging obstacles to overcoming HWC because of their long-term duration (Barua et al., 2013). It is also noteworthy that women and other marginalized sects of society are particularly impacted by hidden costs (Barua et al., 2013; Jadhav & Barua, 2012; Ogra, 2008; Ogra & Badola, 2008). This makes it even more important that the

conservation community become aware of hidden costs and factor them into their HWC management plans.

As such, his paper focuses on the less obvious connections between human health and HWC. To better illustrate the importance of these hidden costs, this paper uses human-elephant conflict (HEC) in Indian agricultural communities as a case study and analyzes some of HEC's most common human physical and mental costs. It also looks at current conflict management strategies typically employed against HEC—namely, compensation policies and prevention techniques like crop guarding—and evaluates them from a One Health perspective in light of the hidden costs just discussed. Ultimately, this paper shows that HEC management strategies and by extension, HWC management strategies, need to revise, create, and facilitate more effective mitigation techniques that are informed on a One Health axis. This means balancing the needs of both ecological and social, psychological, and physical health, which will help account for hidden costs and reduce the negative effects of HWC that undermine conservation progress.

Deleterious Effects on Mental Health

Mental health conditions as a result of HEC can be experienced either by the direct victim of an elephant and/or by the family members as they try to support a victim or cope with a death (Barua et al., 2013; Chowdhury, 2014; Jadhav & Barua, 2012; Ogra, 2008). There are many ways mental health can be negatively affected, but some examples include direct victims reliving traumatic memories of elephant attacks, becoming depressed because of a disabling injury, or needing to cope with fear, anxiety, and stress as they face the possibility of a repeat incidence. Families of direct victims may face stress, depression, or other psychological effects if an elephant attack crippled or killed a principal income earner or otherwise important figure in the family. Livelihood security issues, such as crop raiding or home destruction by elephants, also cause these effects (Barua et al., 2013; Chowdhury, 2014; Jadhav & Barua, 2012; Ogra, 2008).

As an example of the potential severity of HEC mental health repercussions, Chowdhury (2014) presented a case study of a man who had survived an elephant attack but faced chronic post-traumatic stress disorder (PTSD) as a result. This man suffered from recurring nightmares,

intense fear of a repeat attack, hallucinations, trouble sleeping, and a changed personality for over six months after the attack. Although he had sought help from both the local doctor and the local priest, the man could only report a partial recovery. Furthermore, the man self-reported a 50% decrease in work capacity as a result of the elephant attack and related effects, which quantifies some of the consequences of mental health conditions arising from HEC (Chowdhury, 2014).

Indeed, decreased work capacity following HEC trauma is a serious concern for someone already living in poverty. In fact, the potency and existence of mental health conditions following HEC is often both caused by and exacerbated by poverty and poor health infrastructure (Jadhav & Barua, 2012). While an elephant attack or crop raid might spark a mental health condition, both the fuse and subsequent fuel is provided by low socioeconomic status (and its predisposition to poor mental health) and a lack of treatment availability to help victims cope with mental health problems. In another case study, Jadhav and Barua interviewed four families as part of their research. They shared a common theme of financial difficulty in coping with various HEC-induced trauma. This is especially evident in cases involving the death of a male head of household. For example, Jadhav and Barua interviewed a widow, Bina, whom they diagnosed with PTSD and depression. Her husband had been trampled to death by an elephant, leaving her to raise their children alone. Becoming a single mother greatly intensified Bina's poverty, as she had to attempt both to earn income and take care of her children. Coping with her resultant mental stress and PTSD, as well as her children's health concerns, was further complicated by the time and financial costs of traveling to and receiving health services – costs even as high as the threat of losing her temporary job (Jadhav & Barua, 2012).

As Bina's case illustrates, her mental health was negatively affected by the elephant attack beyond just grief or trauma over losing her husband. Being low income, she had no savings or assets to rely on, even temporarily, after her husband died: "I have four children to feed and clothe. I haven't got land. From that land you cannot eat. Without goats or cows, you can understand under what conditions this house runs" (Bina, as quoted in Jadhav & Barua, 2012). The stress of this situation no doubt impeded any recovery efforts she could have made to address her PTSD and depression, and the fact that poverty also severely impacted her ability to travel to or pay for health services only added to

this problem. Moreover, even if she could have afforded to visit a health clinic, there is no guarantee they could have helped her. In another patient's case, the clinic lacked needed medications and had to direct them to a mental health center 80 km (49.7 mi) away (Jadhav & Barua, 2012).

As such, Bina's situation demonstrates the difficulty that widows, particularly low-income widows, face when dealing with HEC. It is unclear whether this phenomenon is unique to women, as there were no case studies of or data regarding widowers; however, in another study of Indian agricultural communities, it was found that the serious injury of a female family member led to the redistribution of her responsibilities to the children and other women in the family, not to the men (Ogra, 2008). Barua et al. (2013) also found this redistribution disparity in their review of various studies, which suggests that women may face a greater mental health burden than men in the event of a spouse's death.

In any case, Chowdhury and Jadhav and Barua's studies clearly show the severity of mental health conditions suffered by any victim of HEC, and Jadhav and Barua especially illustrate the significance of these conditions for low-income victims. The latter is crucial because positive perceptions of elephants and support for their conservation are low among poor and less educated people (Kanagavel, Raghavan, & Verissimo, 2014; Ogra, 2009), and these psychological burdens likely explain or contribute to part of this phenomenon.

Decreased Physical Well-Being

Physical injury and poor physical health can also be particularly problematic for low-income citizens, and contribute to their frequently negative perceptions of elephant conservation. Similar to mental health conditions, physical injury, disability, and fatigue can all impair an individual's ability to work and thus exacerbate conditions of poverty (Barua et al., 2013; Ogra, 2008). Fatigue is especially important to recognize because while injury, disability, fatality, and their medical costs are frequently recognized as consequences of HEC (although their secondary psychological consequences may go unnoticed, as discussed previously), fatigue is detected far less often as a cost of HEC (Jadhav & Barua, 2012). Furthermore, fatigue is one of the most common hidden costs of HEC because it does not require direct human-elephant contact

– in an HEC context, fatigue is often caused by nocturnal crop guarding, and therefore lack of sleep (Jadhav & Barua, 2012). Thus, the mere threat of elephant crop raiding is enough to produce hidden costs, regardless of whether or not an elephant actually raids the farmer's fields.

The true hidden costs, however, are not so much the fatigue itself, but the secondary consequences brought about by it. Men face difficulty working much-needed day jobs if they have to stay awake at night as well (Ogra, 2008), and Jadhav and Barua (2012) reported that men frequently used alcohol and other substances to cope with the fatigue and pains brought on by sleeplessness. As a result, Jadhav and Barua also hypothesized that inebriation may play a role in increasing men's risk of elephant attack by impairing their judgment, which brings HEC into a positive feedback loop with its costs. To confirm this, the researchers interviewed additional men, and they found that several men reported being bold enough to chase elephants when intoxicated (Jadhav & Barua, 2012).

Women and children also help guard, however, so they too face its secondary effects (Barua et al., 2013; Ogra, 2008). For example, along with men, they face increased exposure to vector-borne diseases like malaria and trypanosomiasis from greater time in the field (Barua et al., 2013).¹ Fatigue and illness also impact children uniquely by causing decreased school performance and attendance, or even school dropouts entirely, and this can affect their job prospects later in life (Barua et al., 2013; Ogra, 2008).

Finally, not only must the physical risks and costs themselves be considered, but also how and why they are incurred. Examining this question along gender lines finds that across income levels, women are disproportionately at a greater risk of physical injury than men due to gendered responsibility divisions (Ogra, 2008). For example, although both men and women guard fields, putting them both at risk of elephant attack, women hold the sole responsibility of gathering kindling and

¹ Tuberculosis could eventually become a concern for crop guards as well, since *Mycobacterium tuberculosis* and *M. bovis* can infect both humans and elephants (Michalak et al., 1998). However, tuberculosis has not yet been documented in wild Asian elephants, although it exists among captive Asian elephants and has the potential to spread to wild populations (Obanda et al., 2013; Verma-Kumar et al., 2012).

other materials from the forests, which has a high risk factor of elephant encounters. In addition, crop guarding can be an elective activity for adults, whereas forest gathering is an obligation for women, so women are further subjected to greater physical HEC risk than men (Ogra, 2008). Keeping gender disparity like this in mind is important because HEC management strategies must not further alienate women from wildlife conservation by inadvertently increasing their already unequal risk exposure, or by neglecting to address sources of HEC that primarily involve women.

Conflict Management Strategies

Having discussed the most common hidden costs of HEC, as well as their generalized negative effects on conservation success, this paper now turns to evaluating a few commonly suggested strategies against HEC in light of these costs. Physical barriers (e.g. wire fences) and crop guarding are often promoted as strategies to mitigate the number of elephant raids either because of their relative effectiveness or convenience of implementation (Gubbi, Swaminath, Poornesha, Bhat, & Raghunath, 2014; Jasmine, Ghose, & Das, 2015). However, from a One Health perspective, these strategies are undesirable because, as evident from this paper's previous discussion, they come with various health-related disadvantages for the people they are meant to help. Both strategies are quite physically taxing, they increase risk of contracting vector-borne diseases, and they can cause deteriorating mental health (Barua et al., 2013; Jadhav & Barua, 2012; Ogra, 2008). Furthermore, fences are only highly effective at preventing raids when they are well-maintained, and crop-guarding when the elephants are inexperienced raiders (Gubbi et al, 2014; Jasmine et al., 2015), so these approaches are not suitable as primary options for HEC management plans unless the community has the capability to implement resource-intensive strategies.

Government compensation is also a common mitigation strategy, intended to reduce the financial burden of HEC by reimbursing farmers for their crop losses or medical costs from HEC-caused injuries and fatalities (Ogra & Badola, 2008). As might be expected, though, compensation amounts are often inadequate and do little to soothe anxiety or stress incurred by financial losses or medical expenses. Compensation receives a One Health critique because the compensation process

may even contribute to mental health problems by its complicated or discriminating bureaucracy (Ogra & Badola, 2008; Ogra, 2009). Widows face particular difficulty in the compensation process because they lack a male sponsor, and low-income widows face additional hurdles because of their socioeconomic status (Jadhav & Barua, 2012). To illustrate, “a lack of male support can...undermine [a widow’s] ability to assert a successful claim,” and without money, filing compensation claims becomes even more challenging (Ogra & Badola, 2008). In general, literate men are the most frequent supporters of compensation, and this is because the system is structured against low-income applicants and women (Ogra, 2009).

Unfortunately, elephants present an extremely difficult management challenge for conservationists because, as just discussed, common mitigation strategies have high risk-low return tradeoffs (Jasmine et al., 2015). Therefore, rather than responding directly to HEC, the most effective solution seems to be *preventing* HEC by designating large enough protected areas for elephants (Chartier, Zimmerman, & Ladle, 2011). HEC increased dramatically when less than 30-40% of their original forest cover was left, whereas HEC levels were substantially lower above this threshold (Chartier et al., 2011). However, since India already faces intense tension between its expanding population and preserving habitats, the next-best option would be the use of buffer zones and gradual borders between elephants’ protected areas and human establishments (Gubbi, 2012; Nyhus & Tilson, 2004). While elephants are capable of roaming far distances and can still pose a problem to industries like agroforestry within the buffer zones, the amount of HEC still declines around buffered protected areas in comparison to non-buffered protected areas (Gubbi, 2012; Nyhus & Tilson, 2004). The form of a buffer zone can vary but, for example, a conservation park may be designed with non-forested habitat around it to act as a cushion between the forested protected area and agricultural assets (Nyhus & Tilson, 2004). Even though it does not completely eliminate HEC, it has been found that this buffer of unsuitable elephant habitat helps deter HEC. Buffer zones are also more capable of incorporating existing landowners and populations into their layout than strictly protected areas and so pose less of a relocation threat to local villages (Nyhus & Tilson, 2004).

Looking Forward: Integrating One Health into the HWC Narrative

In the end, though, no conflict management option is without its tradeoffs, and the choice of strategy has to be tailored to the local situation. The purpose of this paper has not been to denounce all HEC management options because of their health risks or effects, only to bring awareness to the existence of hidden costs to HWC management strategy. After all, conflict management plans are designed in conjunction with risk assessments, and it is impossible to make an informed decision when significant consequences remain unknown or unconsidered.

Overlooking confounding factors is a common problem among unilateral approaches, and this is why a One Health, multi-disciplinary approach can help. It is clear from review of the psychological and physical consequences of HEC that human health is very much at stake in conservation, and thus, One Health is necessary to account for that. An interdisciplinary team could advise a holistic conservation approach that better addresses the diverse fallout effects of HWC. For example, working in collaboration with community developers and health practitioners might provide more convenient and available resources for citizens to cope with negative effects of HWC issues. Even better, collaborative efforts could possibly invent new mitigation strategies that are both informed on a One Health axis and could improve conservation success through a multi-pronged approach. Nonetheless, regardless of what form it takes, One Health ultimately gives conservationists a more complete picture of the psychological, health, and social factors that influence the outcome of mitigation strategies. Thus, approaching HWC management from a One Health perspective will improve its success, and this will be imperative if conservation is to remain relevant in the face of its HWC challenges.

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