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Article

Compensation as a Policy for Mitigating Human-wildlife Conflict Around Four Protected Areas in Rajasthan, India

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Abstract

In India, human-wildlife conflict (HWC) around protected areas (PAs) has magnified social conflict over conservation and development priorities. India introduced financial compensation for HWC as a policy solution to simultaneously promote human security while protecting biodiversity. We evaluate compensation as a mitigation policy for HWC around four protected areas in Rajasthan (Jaisamand, Sitamata, Phulwari, and Kumbhalgarh). We argue that compensation is failing to reconcile conservation and development priorities for two reasons. First, a focus on charismatic megafauna obscures the livelihood costs of human-wildlife interactions as reported by households, especially conflict perpetrated by non-priority herbivores like antelope. This highlights disagreements about what constitutes 'acceptable' conservation costs between communities and the state. Second, government bureaucrats control the compensation process, a model incongruent with the highly negotiated and reciprocal nature of environmental governance at local levels. Using interviews with Rajasthan Forest Department officials (n=21) and household surveys (n=2234), we argue that compensation is a policy designed to conserve (internationally) threatened species and not to safeguard local livelihoods. Ultimately, we suggest that policy solutions that are insensitive to local ecological and social dynamics can undermine efforts to reconcile conservation and development goals.

Keywords: human-wildlife conflict, protected areas, compensation, biodiversity conservation, India

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INTRODUCTION

In the global South, stakeholders continue to debate the benefits and costs of biodiversity conservation, especially for individuals living near or within protected areas (PAs) (Nyhus 2016). Conservation advocates at the global, regional, and domestic levels—which increasingly include natural and social scientists, concerned citizens, and political leaders—view setting aside designated areas for the conservation of biodiversity as a necessary public good (Johnson et al. 2014). Emphasis on PA establishment and management to reduce biodiversity loss, particularly in megadiverse countries like India, has thus magnified social conflict over conservation and development priorities (Naughton-Treves et al. 2005; Redpath et al. 2015; Bhagwat 2017). Under pressure to simultaneously prioritise development

and conservation objectives, governments across the global South have attempted to deliver win-win policy solutions that promote human security while protecting biodiversity (Naughton-Treves et al. 2005; Faizi & Ravichandran 2016). However, policies intended to reconcile conservation and development goals have produced unintended social outcomes that potentially undermine conservation objectives (Sanderson 2005; Dickman 2010).

Within this framework, the literature identifies human-wildlife conflict (HWC) as a critical source of insecurity for individuals living near or within protected areas (PAs), especially where it interferes with their ability to meet subsistence needs (Sunderlin et al. 2005; Nyhus 2016). A variety of studies across diverse contexts—but especially in Africa—show that that the cost of conservation continues to be borne directly by rural households in proximity to PAs while benefits are more diffuse in nature (Cernea & Schmidt-Soltau 2006; West et al. 2006; Treves 2009; DeMotts & Hoon 2012). In India, HWC is a pressing concern given high population densities around PAs, which places residents in direct contact with wildlife (Karanth et al. 2013a). To address conservation costs, the Government of India (GoI) has implemented financial compensation for livelihood losses resulting from HWC as a policy solution. The GoI, at both central and state levels, considers compensation an important policy tool that mitigates economic losses resulting from human-wildlife interactions while potentially reducing retaliation and promoting tolerance for conservation activities (MoEF 2008, 2011). India's compensation policy thus attempts to balance preservationism with sustainable development (GoI 2014), and promote co-habitation by offsetting (economic) costs incurred by people who live around protected areas and interact with wildlife. However, the ability of compensation policies to address HWC costs has been questioned in the literature: numerous studies across India and elsewhere demonstrate that compensation often fails to meet its objectives (Madhusudan 2003; Mishra et al. 2003; Ogra & Badola 2008; Ogra 2008; Dickman et al. 2011; Barua et al. 2013).

This article explores how financial compensation for HWC affects conservation and development outcomes around four PAs in Rajasthan, India. Utilising data from interviews with Rajasthan Forest Department officials (n=21) and household questionnaires around Jaisamand, Kumbhalgarh, Sitamata, and Phulwari Wildlife Sanctuaries (n=2234), we argue that compensation is not alleviating conservation costs for households in Rajasthan because it obscures the actual livelihood costs of HWC for communities around PAs as reported by individual households. We identify two mechanisms to explain this outcome. First, a focus on charismatic megafauna in wider India has created an institutional pathway that recognises and legitimises livelihood losses only in relation to particular forms of HWC. Compensation in India originated to preserve large charismatic species like the tiger and elephant, which became flagships for conservation efforts in the 1970s and 1990s respectively (Kothari et al. 1995; Rangarajan 2001). The institutional origins influenced how the state defines wildlife damage and who is eligible for compensation. Crop loss inflicted by species like wild pig and nilgai (Asian antelope) tends to be overlooked for compensation. Thus, individuals experiencing HWC near PAs in which priority species do not occur often pay a higher livelihood cost for conservation. This papers asks how compensation policy that only partially and selectively addresses problems related to HWC can reconcile conservation and development.

Second, the compensation process is controlled by a cumbersome bureaucratic process within the Rajasthan Forest Department that rigidly defines HWC events and prescribes outcomes using a primarily neoliberal model of cost-benefit analysis (e.g., Büscher 2010). This model is incongruent with the highly negotiated and reciprocal nature of environmental governance at local levels, which favours selective enforcement to balance the conservation goals of the state with the subsistence needs of the surrounding communities (Robbins et al. 2007; Chhangani et al. 2008). Centralised control maintains state scrutiny throughout the compensation process (Scott 1998), effectively disempowering local residents by removing bargaining power that is essential in negotiating mutually beneficial outcomes. As a result, compensation as a policy may deepen insecurity for both humans and wildlife.

This paper ultimately attempts to contribute to three areas in the vast and increasingly interdisciplinary literature exploring HWC. First, we utilise institutional theory to posit that path dependencies can affect how policy makers perceive HWC and how they attempt to address it. Specifically, this case brings into sharp relief the way in which institutional fit and path dependencies distort policy outcomes critical to integrating conservation and development. Second, we add to literature examining the efficacy of compensation as a policy tool. We provide a concrete example of how compensation policies intended to alleviate conservation costs paradoxically exacerbate social inequities. Results from this case study corroborate similar findings on compensation and HWC elsewhere in India (Ogra 2009) as well as in the southern African context (DeMotts & Hoon 2012). Finally, this article is intended to contribute to a growing literature on the role of compensation in addressing HWC in India. Rajasthan has been underrepresented in the current mosaic of Indian HWC research. We attempt to address a gap in the Indian context that may help the GoI develop HWC policies that better address regional variations in human-wildlife interactions (Karanth & Kudalkar 2017). Our conclusions highlight ongoing disagreements in conservation and development debates between communities in proximity to PAs and the state about what constitutes *acceptable* conservation costs. We build on our findings to discuss ways to improve the process of compensation.

HWC IN INDIA

Wildlife and/versus People Debates

India has struggled to reconcile human-wildlife coexistence for over a century (Kothari et al. 1995; Rangarajan 2001), and there

remains substantial disagreement about the extent to which humans and wildlife can co-exist (Rangarajan & Shahabuddin 2006b; Karanth et al. 2008). India's conservation movement began in earnest in the late 1920s and early 1930s under British colonial rule. The first protected area was established in India in 1935; however, it was not until the early 1970s that wildlife conservation gained a foothold in Indian politics (Rangarajan 2001, 2006). Under Prime Minister Indira Gandhi, India passed the Wildlife (Protection) Act of 1972 to create new protected areas, banned export of tigers and leopard skins, and secured international funding for conservation efforts (Rangarajan 2006). In 1973, the Indian Government launched Project Tiger—the largest conservation project in the world at the time—aimed at conserving the large cat through protected area development (Rangarajan 2001; GoI 2015a).

The passing of the Wildlife (Protection) Act in 1972 contributed to increased 'social animosity' towards conservation because communities in densely populated areas surrounding the PAs that were established perceived efforts to protect charismatic wildlife as detrimental to livelihoods (Rangarajan 2001: 120). Rangarajan (2001: 114) estimates that throughout the 1980s, 1 in 5 protected areas reported "physical clashes between authorities and residents." Much conflict centred on tiger conservation because the species required large core areas in which human activity was severely curtailed or banned. With the launch of Project Elephant in 1992, the GoI extended conservation efforts to protect important elephant habitats and corridors. The goal of both initiatives was to enhance "protection of these species, and their habitats on [a] countrywide scale" (Karanth et al. 2008: 2359). The focus on conservation in India mirrored global patterns and resulted in a 10-fold growth in PAs between 1969 and 2001, with almost 5% of India's total landscape designated as protected (Rangarajan & Shahabuddin 2006b; GoI 2014).

The fortress conservation model was critiqued in India and elsewhere for excluding local inhabitants from critical habitats, ignoring subsistence needs, and promoting conservation of wildlife above citizen's rights (Naughton-Treves et al. 2005; West et al. 2006). Gradually, law and policy began to address these critiques. Decentralisation programmes in the 1980s and 1990s attempted to devolve power to allow state governments to address local challenges. Community-based conservation efforts took root across numerous forest communities (Agrawal 2005; Fleischman 2015). The GoI passed the Scheduled Tribes and Other Traditional Forest Dwellers Act in 2006 to "recognize and vest forest rights to forest dwelling people" (Karanth et al. 2008: 2359). This act, in addition to the Biological Diversity Act (2002), empowered village-level institutions to engage in Joint Forest Management programmes (Ogra 2009; Faizi & Ravichandran 2016). However, disagreement about people's place in conservation persists among stakeholders: in 2002 the Indian Supreme Court ruled to enforce a total ban on human use in all sanctuaries (Robbins et al. 2007). Further, resettlement projects in some of India's PAs continue to promote debate about conservation and development priorities (Rangarajan & Shahabuddin 2006a; Karanth 2007).

Within this context, the GoI and assorted conservation advocates have recognised HWC as an issue with the potential to undermine conservation efforts within and around India's expanding reserve system (Karanth et al. 2008; Karanth et al. 2013b). As protected area development limited the extent to which local communities could access and use forest resources, it simultaneously increased the rate at which people encountered and interacted with wildlife. Across numerous contexts, research demonstrates that wildlife located within PA boundaries disperse outside into neighbouring settlements and cultivated areas, which can lead to conflict (i.e., loss of crops and/or livestock, property damage, and human injury and death) (Chhangani et al. 2008; Treves 2009; DeFries et al. 2010; Karanth et al. 2012; Nyhus 2016). As a result, reserve boundaries become potential hotspots of conflict as households in proximity to PAs experience a disproportionately higher number of negative wildlife interactions (Karanth & Kudalkar 2017).

The idea that increased human-wildlife interactions necessarily leads to conflict remains contested within the conservation and development literature (Goldman et al. 2010). Indeed, a number of scholars have called for a more nuanced approached to thinking about human-wildlife interactions, especially in a context like India where certain wildlife species are considered important to protect for religious and/or cultural reasons (Chhangani et al. 2008; Dudley et al. 2009; Ghosal et al. 2015). In Rajasthan, for example, there remains a strong taboo against hunting nilgai because of their sacred status despite their reputation as crop raiders (Chhangani et al. 2008). Examining the concept of human-wildlife conflict more broadly, Redpath et al. (2013) note there is little consensus about what constitutes the main drivers of conflict and how those drivers can be mitigated. Increasingly, those who work on HWC issues are of the belief that conflict may be more social in nature (i.e., human-human conflict) than ecological (i.e., human-wildlife conflict) (Dickman 2010).

While recognising the complex nature of human-wildlife interactions (Goldman et al. 2010), we proceed with the concept of *conflict* for three reasons. First, there is evidence in the Indian context that a focus on PA development has increased negative interactions between communities and wildlife that contribute to livelihood losses (Rangarajan 2001; Saberwal & Rangarajan 2003; Rangarajan & Shahabuddin 2006a; Karanth et al. 2008; Ogra 2009). Second, the GoI itself views human-wildlife interactions mainly in terms of conflict (see, for example, GoI 2014). While the GoI's conservation efforts may benefit from a more nuanced view of human-wildlife interactions, our goal is to critique its efforts to use financial compensation as a policy tool to address HWC. Finally, Brandon et al. (2005) argue that competition over rural land use in the global South is likely to increase over the next century as efforts to protect natural habitats confront pressure to convert them for human use. As such, HWC in the Indian context may be self-perpetuating if responses to "direct interactions between humans and other species" (Redpath et al. 2013: 100) do not fundamentally address the underlying policy

drivers that can contribute to HWC (Anthony et al. 2010; Dickman 2010).

Governance Tools for HWC Mitigation

India embraced compensation as a policy solution to HWC because it attempts both to (1) alleviate the cost of direct interaction and (2) reconcile at least one driver of HWC by recognising the economic impact of living in proximity to PAs (MoEF 2002, 2011). While compensation is not the only HWC mitigation tool in India, it is the most widely used and probably the least contentious, given debates surrounding resettlement (Agrawal & Redford 2009), efficacy of crop-guarding techniques (Barua et al. 2013), and culling (GoI 2014). However, in Rajasthan—as across numerous Indian states—compensation appears to achieve neither of these objectives.

Questions about the efficacy of compensation are well documented in the wider literature (Dickman et al. 2011; DeMotts & Hoon 2012; Ravenelle & Nyhus 2017). Research has pointed to the idea that compensation can paradoxically increase retaliatory incidents against wildlife (Goldman et al. 2013), introduce issues of moral hazard (Zabel et al. 2011), serve as unintended agricultural or livestock subsidies (Bulte & Rondeau 2005, 2007), undervalue or obscure particular costs to households or forms of wildlife damage (Ogra 2008; Barua et al. 2013; Karanth et al. 2013a), exacerbate social inequities along gender and class lines (Ogra & Badola 2008; Dickman et al. 2011), increase the possibility of elite capture (Robbins 2000), or misidentify affected stakeholders (DeMotts & Hoon 2012; DeMotts & Swatuk 2012). In India specifically, social factors like gender, class, or caste may impact one's ability to obtain compensation (Ogra & Badola 2008; Ogra 2008). Some scholars have moved to consider insurance schemes (Mishra et al. 2003), conservation or performance payments (Dickman et al. 2011; Nyhus 2016), and other economic incentives/benefits (i.e., increased tourism) as alternatives to compensation. While we acknowledge debate in the larger literature about the efficacy of compensation to mitigate HWC, data from this study suggest such problems in India are those of form rather than function. Functional issues like moral hazard—households neglect defensive measures to deceive the state and access compensation—have been established as a problem in Europe and North America (Zabel et al. 2011); however, we concur with Zabel et al. that concern about moral hazard is exaggerated in the literature, especially in the global South. It is unlikely that households in developing contexts would sacrifice a primary source of income in the form of livestock or crops to access a compensation system that, even if reliable, provides payments at or below livestock or crop value. Further, we recognise compensation as an institutionalised response to HWC in India, one that would be difficult to remove or replace outright. Our goal is thus to understand why compensation is not working as intended in Rajasthan (and India more broadly) and suggest practical ways to enhance its efficacy.

India-specific literature has examined deficiencies in relation to compensation in a state-by-state manner. Mishra et al. (2003: 1514) argue that in Himachal Pradesh compensation for livestock loss was "ineffective as a result of bureaucratic apathy." In Maharashtra, Agarwala et al. (2010: 2950) found that only 3 of 116 people interviewed received compensation after applying, and people with no education were unlikely to request compensation. Ogra (2008: 1409) argues that social factors like gender create "hidden costs" (i.e., increased workloads for women) for which compensation schemes do not account. Karanth et al. (2012) demonstrate that although 73% of households surveyed around Kanha National Park in Madhya Pradesh experienced HWC, only 26% reported losses to the GoI. Karanth et al. (2013a: 182) further demonstrate that due to concerns about time and costs, respondents around PAs in Karnataka only reported losses for high value species "such as elephants and tigers, compared to others such as pigs and leopards." Finally, Ogra and Badola (2008: 718) note that compensation applicants in Uttarakhand face numerous obstacles including "evaluation of claims of damage, determination of fair values for losses, delivery of payment in a timely and transparent fashion, issues of fraud and corruption, and maintenance of adequate sources of funding."

The compensation literature from other states along with our own Rajasthan data suggest two ways to think about the procedural effectiveness of compensation as a policy tool in India. First, early conservation efforts around charismatic megafauna—especially tiger and elephant—shaped compensation as an institution, creating a process that focused disproportionately on predators and large-scale damage. In response, the process of claim verification became institutionalised to exclude other forms of HWC, especially crop raiding inflicted by non-elephant species. Second, the centralised compensation process fails to account for power differentials between state officials and communities, and the bargaining that ensues. Forest officials lack power to enforce state laws and policies on the ground while communities lack power to access resources found in the protected areas. Accordingly, each party accepts trade-offs in order to achieve specific objectives—a phenomenon that Robbins et al. (2007) label selective enforcement. As a state-controlled process, compensation loses flexibility to define HWC according to local constructs and removes bargaining power from each party.

Tigers and Elephants Shape an Institution

Compensation became available as a state-led response to HWC as early as 1973 as an integral part of Project Tiger—the largest conservation project in the world at the time aimed at conserving the large cat through PA development (MoEF 2008; GoI 2015a). Spurred by funding from a number of major international conservation groups—especially the World Wildlife Fund, which ultimately pledged over a million dollars for tiger conservation in Asia—the GoI embarked on setting aside critical tiger habitat through the designation of reserves

(Rangarajan 2001). Protecting land for tiger conservation was of strategic significance to actors at national and international levels but of less local utility, which drove political grievances at the subnational level (Dickman et al. 2011). Rangarajan (2001: 95) argues: "It was perhaps inevitable that the tiger would be central to the controversy" as it was "being transformed into a symbol for the preservation of wildlife."

The state extended compensation for tiger HWC to improve conservation outcomes and address concerns that large carnivores posed an elevated risk to livelihoods, resource access, and safety. Mishra et al. (2003: 1514), for example, observed a continuing "deep resentment among [villagers] against large carnivores and against wildlife managers." Similar motivations have been used to justify the use of compensation in other parts of the world, especially Africa (Dickman et al. 2011; Goldman et al. 2013). Most Indian states have attempted to ameliorate such resentment by adapting compensation policies for livestock losses, human injury, and death. Between 1980 and 2014, 26 of 29 Indian states moved to compensate for carnivore-related HWC. Compensation policies have expanded to include other priority wildlife; however, a central directive allowing states to determine policies for wildlife conservation "as per prevailing norms of the State" has amplified variability between states (MoEF 2008: 8).

Project Elephant was launched in 1992 in 13 states to protect elephants and their habitats, and to address issues of human-elephant conflict (GoI 2015b). The project scope has since expanded across 16 Indian states. For example, in 2000 Tamil Nadu started compensation for livestock killed by panthers, and suggested including elephants (EFD 2000). By 2011, elephant HWC was compensated in Tamil Nadu owing to the annual loss of several human lives (EFD 2011). Similarly, elephants were found to cause 'substantial…crop losses' in Bhadra Tiger Reserve, Karnataka (Madhusudan 2003: 472). While crop damage is the most prevalent form of HWC in both Asia and Africa (Sukumar 1991), only 22 Indian states compensate for crop damage (Rajasthan is not one).

The emphasis on tiger/carnivore conservation and corollary emphasis on elephant conservation created pathways within state governments that defined HWC in relation to high-profile, conflict-prone species (Seidensticker et al. 1999). It simultaneously depoliticised HWC related to non-priority species – legitimising certain conservation costs while delegitimising others (Büscher 2010). Resulting path dependencies have masked broader HWC and narrowed institutional responses so they can no longer address incongruent incidents (Greif 2006). A substantial amount of wildlife damage in Rajasthan by herbivores (e.g., antelope, wild pig, and monkey) remains largely invisible within the compensation process. Thus, those who function within the institution may be constrained in their ability to respond to HWC, even if they recognise a gap between policy and ground realities. Those outside of the institution may perceive the state as unwilling to address the true social and economic costs of conservation and related conflict.

We see evidence in the literature and from our own study that suggests path dependencies present difficulties for India's compensation programme. In the literature, Sekhar (1998: 160) contends that crop damage by nilgai, blackbuck, wild pig, Indian gazelle, porcupine, and elephant is a critical problem reported from "almost all corners of India." Around Sariska Tiger Reserve in Rajasthan, nilgai was the largest source of crop damage in surveyed villages (Sekhar 1998). The GoI has further acknowledged this problem, underscoring that "significant damage…is often caused by the nilgai or wild pig or monkeys, with no recourse available with the local authorities to contain the hardship" (GoI 2014: 39). This helps explain why households in the Western Ghats were more likely to report losses incurred from "high value species such as elephants and tigers" while forest officials were more likely to verify claims where "reported crop loss is high or involves death or injury to livestock and people" (Karanth et al. 2013a: 182). The disparity of what people experience as HWC versus what the government recognises as HWC creates distinct perceptions of the problem, risks, costs, and benefits of compensation (Dickman 2010).

Centrally Controlled, Locally Negotiated

While India possesses an extensive policy and legislative framework as well as well-defined institutions at the national and state level, implementation and enforcement remains a challenge for the state and federal government (GoI 2014). Fleischman (2014) highlights many reasons why state Forestry Departments struggle to implement their mandates; we focus on two. First, the GoI decentralised administrative powers of governance while increasing the number of PAs, leaving state governments with fewer personnel and funds as their scope expanded (Agrawal 2005; Robbins et al. 2007). Second, the structure of the Forest Department bureaucracy, situated within complex local social relations, perpetuates a system of "extra-legal exchange rules, rooted in local systems of power" (Robbins 2000: 433). This makes local context a critical determinant of HWC outcomes as understaffing issues and local power relations set the terms by which forestry officials and communities engage in resource governance (Robbins et al. 2009; Fleischman 2015).

Such constraints require forestry department officials to engage in "concessions and compromises with local people [that] are…ongoing" (Robbins et al. 2007: 374). Robbins et al. (2007: 374) demonstrate that Kumbhalgarh's management structure is "hierarchical in character" but that "discretionary authority" at lower ranks of the Forest Department "is central to its functioning." Discretionary authority allows decision makers at different scales to "use their intimate knowledge about members of the community to ensure that power is wielded neither too forcefully nor too weakly" (Agrawal 2005: 93). This tactic reflects governing realities on the ground, where uneven enforcement authority produces a context in which fines and rules are often developed *ad hoc* so that lower-level forest officers can meet their obligations to the forestry department and be seen as responsive to local needs (Robbins et al. 2007: 375).

Evidence from the literature suggests that rent-seeking behaviour may benefit both the state and individuals if it helps either side achieve specific objectives (De Soto 1989). For households, such objectives might include access to reserves or the ability to negotiate fines for 'unauthorised access.' For the state, this might include an enhanced ability to conserve resources in the reserve with local support (Robbins et al. 2007). Chhangani et al. (2008) point to this negotiated local relationship to explain how informal bargaining between forestry officials and households can impact perceptions of HWC. At the most local levels, HWC is constantly redefined and negotiated according to context.

Locally defined and context-dependent HWC remains at odds with the process of compensation in Rajasthan. A compensation claim follows a prescribed path from the lowest levels of the Forest Department (Forest Guards, Foresters, and Forest Rangers) to the highest (District Forest Officers and Division Conservator of Forests), maintaining state visibility and control throughout the process. Most forest officers argue that state control over compensation is necessary to prevent corruption because money is flowing from the state as cash payments rather than to the state as infractions for forest use (authors' interviews). This observation, however, fails to account for rent-seeking behaviour that already exists within the hierarchical structure of the forestry department, the extent to which activities in sanctuaries are negotiated, and the dispersed nature of power between forest officers and surrounding communities (Robbins et al. 2007; Chhangani et al. 2008).

MATERIALS AND METHODS

We utilise data from interviews with forest officials, household surveys, and policy documents around Jaisamand, Phulwari, Kumbhalgarh, and Sitamata wildlife sanctuaries to examine impacts of HWC and compensation on conservation and development in Rajasthan (Figure 1). These protected areas are located in the Aravallis Range of north-west India, with vegetation that consists primarily of thorny scrub and dry deciduous forest (Karanth & Kudalkar 2017). The reserves support a diversity of carnivores, herbivores, and primates, including those most often associated with HWC such as leopard, wolf, jackal, wild pig, langur, chinkara, four-horned antelope, and nilgai (Robbins et al. 2007). Census data for wildlife populations in the reserves are scarce; however, Chhangani et al. (2008) estimate population changes for a variety of species around Kumbhalgarh from 1991 to 2005. According to this data, nilgai populations have been increasing whereas wild pig, hyena, wolf, chinkara, and four-horned antelope numbers have been decreasing. The estimated human population density around the PAs is about 262 people/sq. km (Census of India 2011) whereas the estimated livestock density is 197 livestock/sq. km (Livestock Census of India 2007). The majority of respondents around Kumbhalgarh (76%) Phulwari (80%), Jaisamand (74%), and Sitamata (82%) were educated up to the eighth grade. Households primarily generate income from farming (grain as well as key food and cash crops) and raising livestock. Around Kumbhalgarh, Chhangani et al. (2008) assert households use the reserve to collect non-timber forest products and to graze livestock.

Using a snowball sampling technique, we conducted 21 structured interviews with wildlife and territorial division Forest Department officials in Udaipur and around each protected area in February 2014, including: Division Conservator of Forests (DCF wildlife: 1, DCF territorial: 2), Assistant Conservator of Forests (ACF or wardens of Jaisamand, Phulwari, and Kumbhalgarh), Range Officers (Jaisamand, Phulwari, and territorial officer around Sitamata), Foresters (Kumbhalgarh and Sitamata), and Forest Guards (all). Interviews with forestry officials were conducted in English or through a translator in Hindi, lasting between 60 and 120 minutes. Institutional Review Boards from Duke University and the Indian Institute of Management Udaipur approved the human subjects protocol. Interviews were formal for the purpose of obtaining official Forest Department perspectives. All interviewed officials were informed that we were conducting household questionnaires and responses would be compared with household-level observations. Responses were recorded by hand and although we use quotes to indicate ideas that were communicated directly from officials, these statements should not be taken as direct dictations.

We conducted household questionnaires between January and March 2014, with structured questions that explored conflict incidents (crop-loss, livestock-loss, human injury or death) and compensation experiences. A 10 km radius around each reserve was selected for the study based on prior ecological knowledge of animal movement patterns (Gopalaswamy et al. 2012). This area—about 6506 sq. km—was divided into 502 grid cells (13 sq. km in size, following Karanth et al. 2012, 2013) from which 2234 households were surveyed (Figure 1). We surveyed 494 villages around Kumbhalgarh, 350 around Phulwari, 109 around Jaisamand, and 143 around Sitamata. The villages in each grid were digitised using Survey of India topographic maps and Google Earth imagery (v6.1). We ensured that 60% of villages in every grid cell were sampled. Households within a grid cell were chosen by random opportunistic sampling.

The survey consisted of 52 questions in 12 sections. In order to ensure that we achieved a robust depiction of household interactions with wildlife, we began the survey by asking respondents a neutral question about wildlife occurrence around the household in the past year (section 1). We followed with questions on HWC (section 2), mitigation measures (section 3), land, agriculture, and livestock ownership (sections 4-7), climate change (section 8), and household relationship to the state (section 9). In section 10, we asked respondents about perceptions of wildlife—specifically, whether protecting land for wild species was important and whether they valued certain wildlife species for cultural, political, economic, subsistence, existence, or ecological reasons (section 10). We finished the survey by asking about demographics (section 11) and ethnicity and language (section 12). Surveys were conducted in Hindi. Surveyors interviewed any person—male or female—that was

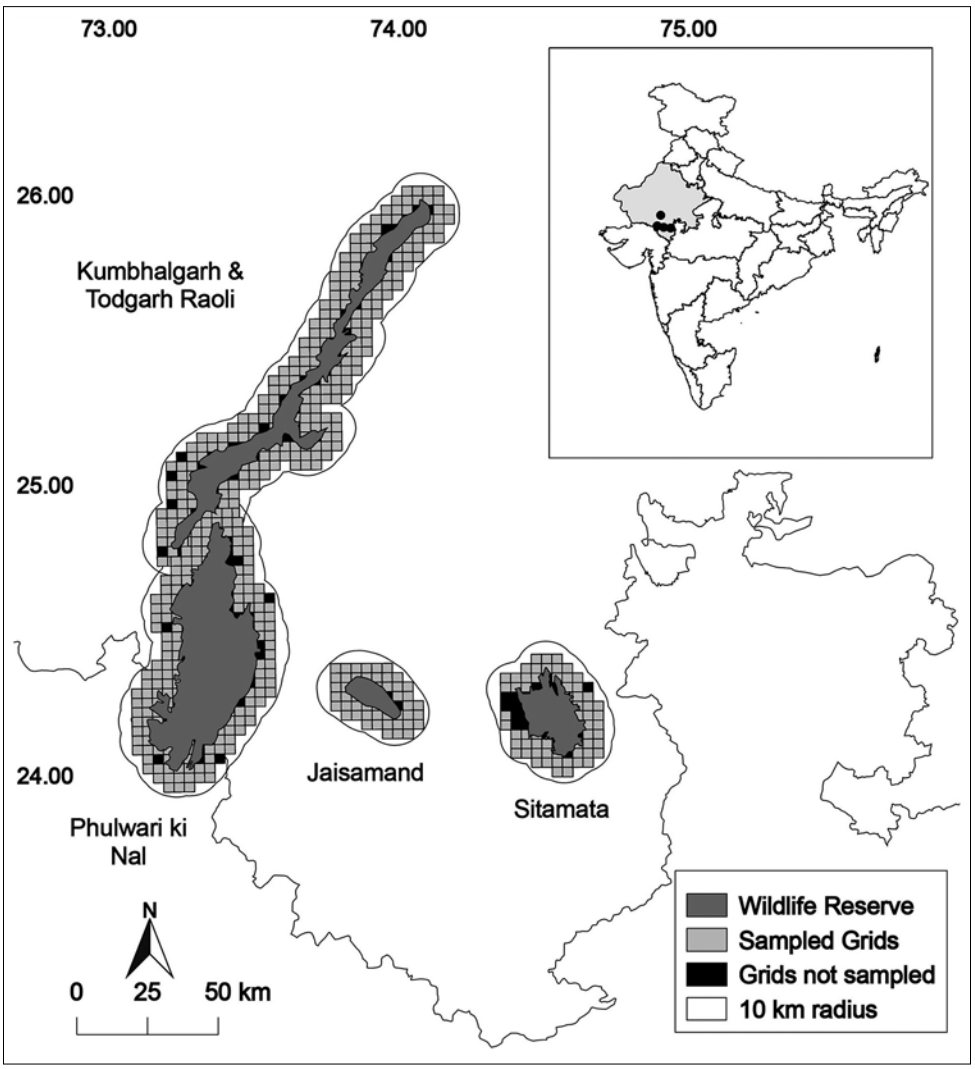

Figure 1
Wildlife sanctuaries sampled in Rajasthan, India:
Kumbhalgarh (610 sq. km), Phulwari (511 sq. km), Sitamata (423 sq. km), and Jaisamand (52 sq. km)

home at the time the visit was made and was willing to engage with the researcher. Although we attempted to obtain an equal number of male and female respondents, we did not attempt to elicit distinct responses based on gender. The information collected was restricted to interactions that occurred in 2013-2014 to avoid errors of memory recall.

RESULTS AND DISCUSSION

A Tale of Two HWCs

Interviews with wildlife and territorial Forest Department officials across all levels revealed that they did not perceive HWC to be an important issue in Rajasthan. A Forester in Jaisamand suggested that "conflict does not have much of an impact and is rare. It usually happens when [a] boundary [is] missing between the village and protected area" (Feb 13, 2014). The Range Officer of Jaisamand similarly observed, "incidents do not happen very often. More dependent people keep their livestock closer. So, less needy people are more likely to have livestock killed" (Feb 13, 2014). Around Phulwari, "incidents [have] occurred five to six times in the past four to five years. [This is a] very [low] percentage and [is] not a big problem" (ACF Feb 19, 2014). The Forest Guard in Phulwari disagreed with the degree of impact but agreed that the number of incidents remains low: "This is a big issue for people around here: [the government does] not compensate enough, but there are only one to two conflicts in a year" (Feb 20, 2014). A Forest Guard in Kumbhalgarh argued: "HWC is not a big problem here" (Forest Guard, Kumbhalgarh Feb 21, 2014). Finally, the Forest Guard in Sitamata was "sure that HWC is very rare" because there had been "no wildlife conflict experiences in the last four years or compensation claims;" however, "people underreport because of the compensation process, [the] paper formality is too much" (Forest Guard, Sitamata Feb 24, 2014).

Conversations with forest officials reflect a definition of HWC that accounts only for livestock predation. In Rajasthan, early compensation efforts revolved around tiger

conservation in Ranthambore National Park and Sariska Tiger Reserve. The state receives no financial or technical support for elephants via Project Elephant; thus, incidents with herbivores are not immediately linked to questions about HWC. The DCF-Wildlife of Udaipur argued: "[The government] need[s] to know [about] cases causing damage to agriculture…[the government] does not know about it in Rajasthan. If there were greater demand for policies like agricultural compensation, the government might change to provide it" (Feb 18, 2014).

When pressed about herbivore related HWC, forestry officials at lower levels readily admitted that crop damage is an important issue in Rajasthan even if it is not formally defined as HWC. "Nilgai eat and trample crops—[they cause] huge destruction. Farmers have stopped their farming because of nilgai" (DCF-Territorial, Udaipur, North Feb 18, 2014). The ACF of Jaisamand contends, "antipathy [has] increased for herbivores like nilgai [because they are] eating crops" (Feb 12, 2014). A Forester in Jaisamand noted that there is "no compensation for crop loss—[the] Forest Department rules say [it is not allowed]. Crop raiding does happen with nilgai or wild pig. If people report [the damage], Forest Department officers will go to observe it but do not compensate for it" (Feb 13, 2014). Around Kumbhalgarh, the ACF observed, "crop raiding is an increasing problem in this area. [We] cannot tell the impact because [we] do not know the extent to which it is happening. [There] can be a wide range of damage—[covering a] large extent of crops" (Feb 21, 2014). In Sitamata, "wild pig damages crops. Nilgai [is] also widespread in Rajasthan. [Households] protect crops by being present in fields at night as well. [There is] no compensation for crop loss" (Forest Guard Feb 25, 2014).

HWC around the four wildlife sanctuaries (Jaisamand, Sitamata, Kumbhalgarh, and Phulwari) looks substantially different when viewed from the household perspective. About 22% of survey respondents were female and 78% male, and the three most common languages spoken were Mawari, Hindi, and Rajasthani. For those households that experienced HWC, we asked respondents to report each incident separately, define the type of HWC (crop damage or livestock depredation), and identify the species involved. About 78% of respondents had experienced some form of HWC in 2013-2014—either crop raiding or livestock depredation. Crop damage was more substantial than livestock loss (Table 1). We modelled whether the sanctuaries were statistically different from one another in terms of conflict outcomes. Jaisamand and Kumbhalgarh had the highest level of HWC (Kumbhalgarh was higher but the outcome was not significant) and Phulwari and Sitamata had significantly less HWC compared to Jaisamand (Table 2). Additionally, we found that crop loss was significantly lower in Phulwari ($p<0.001$) while livestock loss was significantly higher in Kumbhalgarh ($p<0.001$) (Appendix Table).

About 11% of households reported HWC to the Forest Department. Households reported crop damage more often than livestock loss (Table 1). Respondents reported 14.7% of herbivore incidents to the government, as compared to 10.3% of carnivore incidents, a result that is significant using a Chi^2 test at the $p<0.002$ level. When asked about the percentage of crops that were damaged or lost due to crop raids by wild animals, 74% of households indicated losing 0-50% of their yield and 26% of households asserted losing 51-100% (Table 3). Crop loss of 51-75% was common around Kumbhalgarh (25%) and Jaisamand (27%) (Table 3). To further explore these issues, we ran a logistic regression model to examine who was more likely to report HWC to the government (Table 2). The model suggests that being male ($p<0.01$), Hindi speaking ($p<0.05$), and educated beyond 8th grade ($p<0.01$) makes one more likely to report HWC incidents to government officials.[1] This data is in line with other research that has demonstrated the gendered and classist nature of both HWC and compensation (Ogra 2008; Ogra 2009). It also corresponds to observations in the literature that class, caste, and religion are critical in determining who is visible in environmental narratives and government policies (Sharma 2012). Additionally, households possessing greater numbers of livestock were more likely to experience HWC but not significantly more likely to report HWC.

About 99% of respondents did not receive any kind of compensation for HWC; however, about 93% of households indicated not knowing compensation was an option. For those aware of the compensation programme, only 17 respondents reported successfully receiving compensation; of those 17 respondents, 15 were located around Kumbhalgarh. This finding is interesting on several accounts. First, it supports the idea that livestock HWC is more likely to be compensated in areas where livestock predation is significantly higher. Second, it suggests that there may be social factors that impact household access to compensation. Compared to Jaisamand, households in Kumbhalgarh, Phulwari, and Sitamata were significantly less likely to report HWC incidents to the government (Table 2). This outcome was unsurprising for

Table 1

Household HWC incidents recalled and reported to Rajasthan State Forest Department in 2013-2014

	Total (*n*=2234)	Jaisamand (*n*=221)	Kumbhalgarh (*n*=1047)	Phulwari (*n*=683)	Sitamata (*n*=283)
Crop Loss	76%	82%	80%	69%	76%
Crop Income Loss (USD)	164	130	206	110	137
Crop Loss Reported	10%	18%	14%	2%	10%
Livestock Loss	15%	10%	22%	8%	8%
Livestock Income Loss (USD)	68	204	150	21	122
Livestock Loss Reported	2%	3%	3%	1%	1%

Table 2
Logistic regression of HWC and Reported HWC on key characteristics

Variables	HWC	Reported HWC
Male	0.0738	1.043***
	(0.146)	(0.253)
Household Size	-0.00172	-0.0119
	(0.0159)	(0.0183)
Hindi speaking	0.0954	0.329**
	(0.136)	(0.167)
Education over level 8	0.320***	0.659***
	(0.119)	(0.164)
Cattle	0.0517*	0.0139
	(0.0295)	(0.0114)
Log Ag Land	0.0356	0.104
	(0.0653)	(0.0777)
Kumbhalgarh	0.156	-0.424*
	(0.254)	(0.227)
Phulwari	-0.982***	-2.406***
	(0.248)	(0.319)
Sitamata	-0.515*	-0.927***
	(0.278)	(0.284)
Constant	1.497***	-2.635***
	(0.274)	(0.354)
Observations	2,002	2,002

Robust standard errors in parentheses. Jaisamand is reference Park category.
***P<0.01, **P<0.05, *P<0.1

Table 3
Percentage of crop loss for households that experienced crop damage in 2013-2014

Crop Loss	0-25%	26-50%	51-75%	75-100%
Total (n=1700)	27%	47%	22%	4%
Jaisamand (n=183)	25%	46%	27%	2%
Kumbhalgarh (n=831)	24%	45%	25%	7%
Phulwari (n=471)	28%	51%	19%	3%
Sitamata (n=215)	42%	45%	11%	2%

Phulwari, where respondents were less likely to say they would be willing to cooperate with the government. It was more surprising for Kumbhalgarh, however, because respondents living around the PA received the most compensation for HWC, reported higher overall levels of trust in government, and were more likely to attend community meetings to address HWC. Controlling for other variables, we found that the odds of reporting HWC incidents to the government were only 0.654 for households around Kumbhalgarh compared to households around Jaisamand at the p<0.1 level (Table 2). We also found significantly fewer Hindi speakers around Kumbhalgarh. This suggests that access to formal government processes may be limited to more elite households in the area—a finding corroborated in the wider literature (Robbins 2000; Mahanty 2002).

Low livestock loss reporting may be due to ongoing unsanctioned forest use in which households graze livestock within sanctuary boundaries (Chhangani et al. 2008). We asked about the type of HWC experienced but did not request respondents to identify where HWC occurred. Alternatively, compensation may not be the primary method by which households mitigate HWC. The most common mitigation techniques employed by households included going on night watch (60%), implementing scare devices (50%), and utilising fencing (49%) or lighting (41%). Mitigation tended to be lowest around Phulwari (57%) and highest in Jaisamand (85%). These factors could obviate the need to address compensation issues at the state level if households engage in alternate mitigation practices or hunt informally. Households around Kumbhalgarh, on the other hand, engaged in greater efforts to protect livestock.

Even with alternate considerations, low livestock loss overall suggests that livestock depredation is a secondary concern for households. We corroborated this assertion by estimating income lost from crop raiding versus livestock depredation (Table 1). Income loss from crop raiding across all four sanctuaries was estimated to be almost 2.5 times higher than income lost from livestock depredation. Loss of income was significantly higher in Kumbhalgarh (p<0.05) and significantly lower in Phulwari (p<0.001) (Appendix Table). However, the number of respondents reporting income loss from crop raiding is lower than the total sample (n=1636), so these results should be reviewed cautiously.

We averaged the first three incidents recounted across all respondents to demonstrate the overwhelming presence of nilgai-related HWC (Table 4). Herbivores and omnivores including nilgai, jackal, langur, and wild pig were the most common species to be identified in HWC incidents (Table 4). Incidents with nilgai, wild boar, and leopard were more likely to be reported to the government than those with jackal, fox, or langur. All other incidents combined (i.e., species incidents other than nilgai, jackal, wild boar, fox, langur, and leopard) occurred in 21.5% households, with 2.5% being reported to government.

Households around these wildlife sanctuaries were overwhelmingly concerned with herbivore damage—85% of respondents said they were more concerned about potential damage to property from herbivores while only 7% said the same of carnivores (Table 5). Additionally, 82% of households said that their perception of wildlife would improve if HWC were less of a problem (Table 5). Respondents singled out nilgai, jackal, leopard, wild pig, and langur as species towards which attitudes would improve if HWC were effectively mitigated. Despite concern about HWC, a majority of households also reported supporting conservation measures to protect wild species (Table 5). More specifically, respondents across all the reserves indicated they perceived a number of wild species—including those that were involved in HWC—possess both existence and ecological value. This suggests that despite the costs associated with HWC, households continue to perceive benefits to wildlife conservation.

What Defines HWC?

Our data suggest that households in Rajasthan experience social and economic costs from conservation that are not alleviated

Table 4

Species involved in HWC incidents (averaged across first three incidents) and percentage of incidents reported to Rajasthan State Forest Department in 2013-2014

	Nilgai	Jackal	Pig	Fox	Langur	Leopard
Total (*n*=2234)						
Incident	57%	24%	21%	12%	13%	9%
Report	9%	2%	4%	1%	1%	1%
Jaisamand (*n*=221)						
Incident	80%	18%	10%	5%	11%	7%
Report	11%	3%	3%	1%	1%	2%
Kumbhalgarh (*n*=1047)						
Incident	76%	14%	31%	1%	10%	13%
Report	13%	2%	6%	0%	2%	2%
Phulwari (*n*=683)						
Incident	17%	41%	8%	34%	20%	3%
Report	1%	2%	1%	1%	1%	0%
Sitamata (*n*=283)						
Incident	68%	24%	24%	3%	8%	5%
Report	9%	2%	2%	1%	1%	0%

Table 5

Concern about HWC related to carnivores versus herbivores and impact on perception of wildlife value

	More concerned about property damage from herbivores	More concerned about property damage from carnivores	Protecting areas for wild animals is important	Would perceptions of wildlife value improve if HWC was not a problem for you: Yes
Total (*n*=2234)	85%	7%	86%	82%
Jaisamand (*n*=221)	96%	2%	88%	96%
Kumbhalgarh (*n*=1047)	88%	9%	87%	88%
Phulwari (*n*=683)	73%	9%	83%	69%
Sitamata (*n*=283)	98%	1%	89%	82%

through the compensation process. The seemingly paradoxical claim by the Government of Rajasthan that HWC is both rare (carnivore) while also extensive (herbivore/omnivore) is because the government does not perceive crop damage as a form of HWC that can be awarded compensation. Although officials at higher levels in the Forest Department claim to have no knowledge of crop damage in Rajasthan, household level data demonstrate that crop damage is reported to the Forest Department more often than livestock depredation (Tables 1 and 4).

We suggest two explanations for the difference between government perceptions of HWC and what occurs on the ground. First, there is no process in Rajasthan to signal to higher-level forest officials that herbivore damage is a problem because of a path-dependent compensation process designed to support tiger conservation (and later elephant conservation in other Indian states). Rajasthan possesses no wild elephants, so the state may have seen little reason to provide a mechanism for protecting citizens from crop raiding. While lower-level forest officials like Range Officers, Foresters, and Forest Guards may be aware of crop damage, they have little ability to officially communicate such information to policy makers (see Fleischman 2015: 5). The DCF-Territorial Udaipur, North argued: "if there is crop damage, people are not raising the issue to the government" (Feb 18, 2014). As our data demonstrate, people are raising the issue to local government officials (albeit to a limited extent); however, pathways to communicate problems up the chain of hierarchy may be limited for path-dependent reasons (Greif 2006). If HWC damage is not in a form that institutional mechanisms can address, it may go unreported or unnoticed by those with the power to award compensation claims. Accordingly, there may be limited policy space in which to address issues that occur outside dominant HWC frameworks.

Second, households may be limited in their access to formal government processes and/or claimants (and forest officials) may have difficulty providing proof that a wild animal was responsible for damages. These issues may explain the low number of compensation claims awarded even to those areas that experience and report livestock losses. Damage from HWC must be glaringly obvious to apply for compensation (i.e., dead or injured person, half-eaten livestock carcass, trampled crops, trees pushed over, etc.) and the onus remains with the claimant to provide evidence (e.g., photographs, a veterinary report verifying a wild animal caused the damage, corroborating testimony, etc.). Even under ideal circumstances (i.e., livestock loss, a carcass to observe, access to forestry officials or to a state veterinarian), the process for compensation is difficult for most claimants to navigate (Barua et al. 2013). It is made more difficult by social factors like gender, language, or education level that limit access to government services (Table 2). In our study population, the literacy rate was 58% around

Kumbhalgarh, 47% around Phulwari, 36% around Jaisamand, and 48% around Sitamata. Ogra (2009) argues that illiteracy can significantly reduce support for compensation programs, making it less likely that those households seek government assistance. Similarly, women face more obstacles in the process of documenting HWC and obtaining compensation (Ogra 2009). Although we did not attempt to elicit distinct responses based on gender or class, the low number of claims may partially reflect gender or class-specific issues encountered in the compensation process.

Forest Guards noted that the process is often long and cost-intensive, and may include 'extra' payments to help officials arrive at expedient conclusions. A Forest Guard in Jaisamand argues: "what [the] doctor says in the post mortem report affects compensation [a] person gets. If [the doctor] says the animal is worth less or he is not sure what killed it—[the claimant] may get less than the stated rate… or nothing. The government veterinarian is supposed to be free, but he might ask for a side payment" (Feb 13, 2014). The burden of proof remains with the claimant to negotiate an uncertain process and demonstrate that wildlife inflicted significant damage—often, this is only possible with carnivore HWC (carcass) and large herbivore species like elephants (trampled crops, trees that have been uprooted). Even though there is evidence in the literature that wild pig, langur, nilgai, and sloth bear represent major problems for farmers around Kumbhalgarh, the state government remains unconvinced that such damage can or should be compensated (Chhangani et al. 2008). A Forester in Kumbhalgarh reasoned that the government could not provide crop compensation because "crop raiding [is] also done by other domestic animals. [We] cannot prove that wild animals did [the] crop raiding" (Feb 21, 2014).

Differences between what is compensated versus what is experienced as HWC on the ground may represent a conflict over the actual cost of conserving wild species. To the government, compensation is performing as expected—there are few claims for livestock loss and the top levels of government perceive HWC overall to be low. Households, however, report that HWC, especially with herbivores, is a major problem. Thus, households continue to experience high costs to conservation from crop raiding even while the government perceives it is mitigating HWC costs through compensation. Costs include not only monetary losses from crop raiding, but also the opportunity costs associated with commonly used mitigation techniques.

This disconnect may reflect a divergence about conservation priorities in India. In particular, the state may seek to mitigate HWC costs only where they pose a threat to the conservation priorities of wider India. Compensation is a policy tool designed to protect (internationally) threatened and valuable species and not a tool to safeguard local livelihoods from interactions with nuisance species like nilgai, wild pig, or langur. Resolving HWC incidents associated with non-priority species may be less important to the state than those associated with more charismatic megafauna because they have fewer ramifications for broader conservation goals. Despite the fact that local populations of nilgai have increased due to conservation efforts and a cultural taboo around hunting (Chhangani et al. 2008), the state has done little to mitigate their impact on livelihoods. The capacity of compensation to act as a tool to reconcile conservation and development priorities is constrained by the substantial inequity ingrained in a system balanced toward conservation at the expense of livelihoods. This is particularly true in Rajasthan, where a ban on hunting and cultural taboos that prohibit culling nilgai further limit local capacity to address herbivore-related HWC.

Barriers to Change

Despite the disconnect, communities have failed to challenge compensation's procedural inefficiencies. This is surprising given the tendency toward collective protest in other areas of India (Swain 2010). We argue that there are two ways to think about barriers to change compensation policies in Rajasthan. First, HWC incidents are often widely dispersed over space and time, and affect individuals unevenly (Nyhus 2016). Unlike the immediate and collective impacts from exclusion from a PA, the random nature of HWC results in erratic effects that may diminish the possibility of collective action against the state. While all respondents experienced high levels of HWC, incidents were reported to occur at any time of year and affected households to differing degrees even within the same or neighbouring communities. Crop loss is often randomly situated around large areas, and can be impacted by available crops, mitigation techniques, and the distribution of wild animals (Karanth et al. 2012; Karanth et al. 2013a). This tends to promote individual rather than collective-level responses. We found that households tended not to engage in communal mitigation activities such as hiring community guards or contributing money to a communal pot for mitigation or repairs. While we found that respondents were more likely to attend community meetings to address HWC around Kumbhalgarh (23%), this effect was not consistent across sanctuaries (13% in Jaisamand, 6% in Phulwari, and 15% in Sitamata). This suggests that the nature of HWC itself imposes barriers to collective action.

Second, the structure of compensation programmes in Rajasthan—embedded within a centralised public bureaucracy geared toward addressing livestock depredation—poorly fits the local social and ecological context. This misfit produces conditions that encourage small acts of ordinary resistance (Scott 1985) or foster the emergence of extra-legal solutions to HWC (Robbins 2000). Collusion between guards/foresters and individuals to informally address and devise solutions to HWC can perpetuate low expectations of the state and mitigate the need to protest state inaction. Krishna (2002) supports this argument in his observation that in Rajasthan informal mechanisms have worked to preserve community peace in the presence of deep social fissures like caste.

The centralised nature of the compensation process makes it difficult for state officials to respond to calls for change if they emerge. In order to offer crop compensation, the Forest

Department must be convinced that HWC has occurred even when damage is not on par with tiger or elephant HWC. This remains difficult in a highly centralised system that creates distrust of the process on the side of communities but also "feed(s) government suspicion of exaggeration" (DeMotts & Hoon 2012: 844). In the current process, a HWC incident is reported to Forest Department. Forest staff, usually a Forest Guard or Forester, visits the incident site and prepares a draft report in front of the headmen with incident details. Oral evidence is gathered from witnesses. Photographic evidence is taken, and a state veterinary doctor must officially determine in a post mortem report that damage was caused by wildlife. The application is given to the Range Officer who transfers it to the District Forest Officer under the supervision of the Assistant Conservator of Forests (warden of the sanctuary). While this process should occur within 24 hours of the reported event, a Forest Guard in Kumbhalgarh noted it "can take 5-6 days to investigate the claim" (Feb 21, 2014). The District Forest Officer must justify each compensation award to the Division Conservator of Forests in order to be tallied across each district and reported to the Principal Chief Conservator of Forests of the state. This process can take anywhere from one month to one year (Forest Guard in Kumbhalgarh; Feb 21, 2014).

While the extensive compensation procedure reassures forestry officials that the state is in control and the process is free from corruption, our conversations with forestry officials and data from the household surveys suggest ongoing corruption, informal negotiation, and reciprocity around HWC claims (see Robbins 2000 and Robbins et al. 2009). Robbins et al. (2007) argue that within a protected area, it is the Forest Guards, Foresters, and Range Officers that are permanently placed. Because day-to-day decisions are devolved to Range Officers and Foresters, "familiarity with foresters and guards is reported to be essential in negotiating the partial enforcement mechanisms in place and knowing areas where extraction is tolerated" (Robbins et al. 2007: 374-375). While Guards, Foresters, and Rangers are likely to have the most contextually specific knowledge of HWC incidents and wield the greatest influence with communities, they are the least able to influence compensation outcomes in the formal process.

Our data support these assertions. According to a Forest Guard in Kumbhalgarh who was more open to candid conversation: "[g]uards are most closely involved in villages. Foresters are involved mostly in bigger meetings. Many communities depend on forests. In the dry season especially, they can get timber, fuelwood, and grass. [They are] not allowed to take any of these things according to the rules, sometimes it happens 'silently.' Sometimes government officers allow [this] because there is enough felled wood" (Feb 21, 2014). A Forest Guard in Sitamata indicated the arbitrary nature of fines in PAs: "[p]eople mostly collect firewood in protected areas. Twice a month [we] might give out fines… [for example] cattle grazing fines (50 INR or 0.74 USD) and firewood fines (100-300 INR or 1.5-3 USD)" (Feb 24, 2014). The Forest Guard in Kumbhalgarh agreed that fining "depends on behaviour. If the offender acts abusively—if they curse or get angry—[the] fine goes up. If they are repentant then just 100 INR (1.5 USD) is charged" (Feb 21, 2014). In relation to HWC, one Forest Guard around Kumbhalgarh suggested that people are "aware of [the] compensation programme, but they do not claim. [Villagers] don't want to bother forest officials because they are afraid if the Forest Department gets angry with them it will not allow them back in the forests" (Feb 21, 2014). He continued, "He [the claimant] has to live in same village with people and therefore needs to continue [a] good relationship" (Feb 21, 2014).

Ultimately, it is not just communities that benefit from judicious reporting. Maintaining relationships with households in surrounding communities allows forestry officials to carry out their duties more effectively. "[We] also go to villages and talk to them. If a lot of stealing is going on they [forestry officials] will go to the villages and talk it out" (Forest Guard, Kumbhalgarh; Feb 21, 2014). The Forestry Department has a "lack of staff—villagers are very helpful to us [Forestry Department]…[they] help [us] put out fires. Villagers understand that the forests are also theirs" (Forest Guard, Kumbhalgarh; Feb 21, 2014). Selective enforcement enables the government and communities to achieve specific objectives by maintaining flexibility with regard to how they define and bear certain costs. This was also evident in a handful of household surveys where respondents reported receiving non-monetary compensation. For example, two households around Kumbhalgarh reported that the government was instrumental in helping access loans after experiencing crop loss from nilgai.

Resolving the Disconnect Between Communities and the State

One way to resolve the distortion around HWC would be to change state policy and offer crop loss compensation in Rajasthan. However, this recommendation becomes problematic without addressing the highly bureaucratic nature of the compensation process, which communities struggle to navigate. It also does little to address the possible social barriers, especially gender and class, that limit the extent to which households can access government services. Indeed, Ogra (2009) notes that "as long as residents (particularly women) of PA communities remain without viable alternatives, they will continue to reject approaches to HWC resolution that threaten their (even illegal) access to fuelwood, fodder and grass." As a potential solution to the incident-based reporting process, we suggest the state consider an entitlement-based system in which households experiencing some threshold of net losses in agricultural production or within a certain distance from PAs receive an annual payment to offset HWC costs (see Watve et al. 2016). This strategy may ultimately be the most equitable solution given the extent of crop loss around all PAs in our study (Table 3) and the cost of household-level mitigation. An entitlement-based system could theoretically adjust for the costs of a compensation system biased toward conserving priority species and better balance livelihood

vulnerability with conservation goals. It would also eliminate the procedural issues that plague the current compensation policy, creating a more even-handed framework to compensate households that face greater obstacles within the existing process.

Shifting to an entitlement-based system would require political will at the national level and pressure from rural communities, as Rajasthan forestry officials did not view pre-emptive compensation as a viable option. We asked specifically if state officials would consider providing funds to the village level in order to allow leaders to distribute monies that could subsidise preventative measures or address HWC incidents independent of the state. Forestry officials responded in ways that suggest they had difficulty thinking about HWC outside the confines of the state or would resist a redistribution of funds if it eliminated their control of the process or opportunities to earn extra-legal rents. A Forest Guard in Sitamata argued, "people [would] create ideas of how to get money if there was a village fund" (Feb 24, 2014). A Forester in Kumbhalgarh noted: "due to corruption in everyone, a village fund would not be a good idea. [They] can make a fake report. [The] Forest Department honestly distributes more than would village leaders—[therefore] government must remain involved" (Feb 21, 2014). A Range Officer in Phulwari agreed that there was "more chance of fraud if villagers [were] given money, no forest officer could check it out to verify incidents. Corruption or fraud would happen if [we] gave money to villagers" (Feb 19, 2014). These comments underscore the degree to which ideas about social status—class especially—impact perceptions of worth in the compensation process. This suggests that an entitlement-based system, while avoiding the high transaction costs that accompany incident-based compensation, is likely to face resistance from state forestry officials. This is one issue, however, where conservation and rural livelihoods may have substantial synergy, and villagers, NGOs, national politicians, and conservationists may consider joining forces to advocate for change.

Another potential solution would be to administratively decentralise (or deconcentrate) control of the compensation process to the level of the Assistant Conservator of Forests if not Range Officers and/or Foresters within each protected area while simultaneously empowering villages to engage more directly in the compensation process. On one hand, administrative decentralisation (or the deconcentration of public services) implies a transfer of "power to local administrative bodies" in order to "read the preferences of local populations and to better mobilise local resources and labour" (Larson & Ribot 2004: 3). These officials often possess de facto power within reserves and selectively enforce rules in cooperation with local communities. Formally decentralising administrative authority recognises the dispersed nature of power around PAs, the local complexities associated with defining HWC, and the ways in which it can be resolved. On the other, Ogra (2009: 171) suggests that creating village-level institutions can "leave more space for participation by women, enjoy greater levels of local support…, and potentially be more effective at addressing HWC at the smallest scales." Given the extent to which villagers and lower-level forest officials already work together to realise independent objectives, formalising this relationship within a "cooperative village-government institution" may extend benefits to both parties while making the compensation process more efficient (Ogra 2009: 174). Deconcentrating power to lower-level officials moves away from a traditional neoliberal view of cost-benefit and toward a more complex understanding of what households perceive as necessary given local challenges and constraints (DeMotts & Hoon 2012). Yet deconcentrating power may not address inherent inequalities in negotiating compensation solutions to HWC. Forest officials could still use their discretion to discriminate against lower castes, the poor, and women—deepening power schisms that already shape issues of access and grievance redress (Robbins 2000; Robbins et al. 2007). As such, an entitlement system may be the better option to balance conservation and development goals.

CONCLUSION

Compensation as it exists in Rajasthan is doing little to mitigate either direct HWC or narrow the widely divergent perceptions between the state and local communities of what constitutes HWC. Households in proximity to PAs continue to bear a disproportionate amount of the social and economic costs of conservation. This may deepen social and economic insecurity for households around PAs and undermine support for wildlife conservation. A Forest Guard in Jaisamand (Feb 13, 2014) noted that it is common for people to blame the government when interactions with wildlife occur, claiming: "when we get into your sanctuary you fine us, but nothing happens to animals when they come in our fields." This sense of culpability reveals acute awareness of communities that the GoI seemingly views conservation of wildlife species as more important than the livelihood security of its citizens. Such irreconcilable differences may intensify as HWC becomes more prevalent across India and remains unsuccessfully addressed by compensation schemes.

In order to further bring conservation concerns into dialogue with livelihood needs for communities in Rajasthan affected by HWC, the Rajasthan government could compensate for herbivore damage by shifting to an entitlement-based system, which would place livelihood issues on a more equal footing with wildlife conservation. Existing literature suggests that such a policy shift may enhance conservation outcomes by changing people's attitudes toward wildlife and conservation efforts (Mishra et al. 2003). In particular, communities may perceive compensation in this form as fairer and more just. The state could also consider deconcentrating power to local-level forest officials to simplify a complex process and empower households to negotiate outcomes. While this option would more accurately reflect the de facto system in place, it could also enhance rent seeking and corruption. Ultimately, Indian states retain the power to make changes to their conservation

policies; states like Rajasthan should capitalise on these powers to create more successful policies that will improve conservation and development outcomes as well as protect India's legacy of co-existence.

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NOTE

1 About 60% of respondents indicated at least one person in the household educated at the 8th grade level and 14% included someone educated at a 12th grade level or higher.

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