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A STUDY OF HUMAN–WILDLIFE CONFLICT REGARDING THE ROLE PLAYED BY WOMEN IN CROP PROTECTION AND WATER COLLECTION IN THE TERAI REGION

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ABSTRACT

Human–wildlife conflict (HWC) is an increasingly pressing concern along the forest–farmland interface of the Terai region, where dense protected areas adjoin densely settled agrarian communities. While the ecological and economic dimensions of crop raiding and livestock loss are widely documented, the gendered distribution of conflict exposure has received comparatively little attention. This paper examines the specific roles played by women in two everyday, conflict-prone activities—night-time crop protection and the collection of water, fuelwood and fodder—and argues that the prevailing socio-cultural division of labour systematically channels women into the spatial and temporal zones where encounters with wild animals are most likely. Drawing on a synthesis of secondary literature, regional conflict records and field observation in the Balrampur–Suhelwa landscape of the Indo-Nepal Terai, the study develops a conceptual framework of gendered exposure pathways and presents an indicative, multidimensional profile of the burdens women bear. The findings indicate that women are disproportionately responsible for water and fuelwood collection (about four-fifths of household effort) and contribute substantially to crop vigils, yet are markedly under-represented in conflict reporting and compensation processes. Beyond physical injury, women face acute time poverty, restricted mobility, psychological stress and hidden economic costs that conventional damage assessments overlook. The paper concludes that gender-responsive mitigation safer water access, lighting and escort

arrangements, inclusive compensation, and the participation of women in conflict-management institutions is essential for any equitable and durable approach to human–wildlife coexistence in the Terai.

Keywords: *Human–Wildlife Conflict; Gender and Environment; Terai Region; Crop Protection; Water Collection; Women's Vulnerability; Coexistence.*

1. INTRODUCTION

The Terai is a narrow, low-lying belt of alluvial plains, marsh and moist deciduous forest that runs along the southern foot of the Himalaya across northern India and southern Nepal. Historically a malarial frontier of grassland and swamp forest, it has, over the last seven decades, been transformed into one of South Asia's most productive agricultural landscapes while still retaining some of the subcontinent's finest wildlife habitat. The result is a mosaic in which protected areas such as Dudhwa, Katarniaghat and Suhelwa sit immediately adjacent to intensively cultivated cropland and dense human settlement. This proximity, sharpened by shrinking forest cover and increasing wildlife populations, has made the forest–farmland interface of the Terai a persistent zone of human–wildlife conflict (HWC).

Human–wildlife conflict in the region is dominated by crop raiding by elephants, wild boar, nilgai and deer, alongside attacks on livestock and, occasionally, on people by tigers, leopards and sloth bears. The scholarly and policy response has generally framed such conflict in aggregate, household-level terms, measuring the area of crops destroyed, the number of livestock lost or the count of human casualties. What this aggregated framing tends to obscure is that the costs of living alongside wildlife are not distributed evenly within the household. They fall along the lines of an existing gendered division of labour, and women—who shoulder a large share of the daily tasks that take place at the forest edge and at water points—are exposed to conflict in ways that are distinct from, and frequently more burdensome than, those experienced by men.

In most Terai farming households, the protection of standing crops during the harvest season involves extended night-time vigils, a duty that women routinely share. Equally, the daily collection of water, fuelwood and fodder—overwhelmingly the responsibility of women and girls—requires repeated journeys to rivers, ponds, wells and forest margins, precisely the locations and times of day at which dangerous wildlife is most active. Women therefore occupy the conflict landscape in a particular spatial and temporal pattern, and their experience of risk is mediated as much by social roles as by ecology. Despite this, women remain under-represented in conflict reporting, in compensation claims and in the institutions that govern conflict management, so that the full extent of their burden is rarely captured in official records.

This paper sets out to make that hidden burden visible. It asks how the gendered organisation of crop protection and water collection shapes women's exposure to human–wildlife conflict in the Terai, and what the consequences of that exposure are across physical, economic, temporal and psychological dimensions. The

discussion proceeds from a review of the relevant literature, through a statement of objectives and the study approach, to a structured analysis of gendered exposure and its impacts, and finally to a set of policy implications oriented towards a more equitable and effective model of human–wildlife coexistence.

2. LITERATURE REVIEW

Research on human–wildlife conflict has expanded considerably over the past two decades, moving from a narrow concern with the ecology of crop and livestock damage towards a broader recognition of its social complexity. Nyhus (2016) provides a comprehensive overview of the field, arguing that conflict is increasingly understood not merely as an interaction between people and animals but as a contest among people over how wildlife should be valued and managed. Dickman (2010) made the influential case that the social factors underlying conflict—perceptions, attitudes and the distribution of costs—are often more decisive for resolution than the biological intensity of the conflict itself.

Within the Indian context, a substantial body of work has documented the patterns and determinants of crop and livestock depredation around protected areas. Sekhar (1998) quantified the burden of crop and livestock loss around Sariska, while Madhusudan (2003) showed for Bhadra Tiger Reserve that interior villages absorb disproportionate damage from large mammals. Karanth et al. (2012) analysed conflict and compensation around a central Indian reserve and highlighted the gap between losses incurred and compensation received. Treves and Karanth (2003) placed these Indian patterns within a global perspective on human–carnivore conflict, and Inskip and Zimmermann (2009) reviewed felid conflict worldwide, noting the recurring role of livelihood dependence on forest-edge resources.

The hidden and indirect costs of conflict have received growing attention. Barua, Bhagwat and Jadhav (2013) identified a category of "hidden dimensions"—health impacts, opportunity costs and transaction costs—that standard damage assessments systematically miss, and which fall heavily on those who guard crops at night and travel to collect resources. Anand and Radhakrishna (2017) cautioned that perceptions of escalating conflict may partly reflect changing reporting and tolerance rather than absolute increases, underlining the importance of attending to who reports conflict and who does not. Naughton-Treves (1997), in a foundational study of the forest edge around Kibale, demonstrated that vulnerability to crop raiding is spatially concentrated and socially uneven, a finding directly relevant to the Terai's settlement geography.

The explicitly gendered analysis of conflict, though still comparatively sparse, offers the most direct foundation for the present study. Ogra (2008), in a widely cited study of protected-area borderlands in Uttarakhand, showed that women bear distinct and often invisible costs of conflict, including elevated physical risk during fuelwood and fodder collection, heightened workload and psychological stress, and that these costs are poorly reflected in compensation systems (Ogra & Badola, 2008). Gore and Kahler (2012) found systematic gender differences in risk perception associated with conflict, while Khumalo and Yung (2015), working in a Namibian conservancy, revealed how community-based natural resource management can overlook women's specific vulnerabilities. Doubleday (2018) explored the gendered negotiation of living with tigers in Rajasthan, and Distefano (2005), in

an FAO synthesis, catalogued mitigation strategies that rarely account for the gendered organisation of exposure.

For the Himalayan and trans-Himalayan belt that frames the Terai, Mishra (1997) documented livestock depredation and conflict perceptions, Jhala, Qureshi and Nayak (2020) provided the contemporary status of large carnivores and their prey relevant to the region's conflict potential, and recent syntheses by Bhatia et al. (2020) and Sharma, Chettri and Wangchuk (2021) argue for a shift from a conflict-centred to a coexistence-centred framing that incorporates the full social spectrum of human–wildlife interactions. Taken together, the literature establishes that conflict costs are socially uneven, that women are particularly exposed through their livelihood roles, and that this exposure is under-recorded—yet a focused treatment of the Terai's specific configuration of crop protection and water collection remains lacking. This study addresses that gap.

3. OBJECTIVES OF THE STUDY

In light of the gaps identified above, the present study pursues the following specific objectives:

1. To examine how the gendered division of labour in Terai farming households shapes women's participation in crop protection and in the collection of water, fuelwood and fodder.
2. To identify the spatial and temporal points at which these activities bring women into contact with conflict-prone wildlife along the forest–farmland interface.
3. To assess the multidimensional impacts of this exposure on women—physical, economic, temporal, psychological and social.
4. To evaluate the extent to which women participate in, and benefit from, existing conflict-reporting, compensation and management mechanisms.
5. To suggest gender-responsive measures for reducing women's vulnerability and advancing equitable human–wildlife coexistence in the Terai.

4. STUDY AREA AND METHODOLOGY

4.1 THE STUDY AREA

The study is situated in the Indo-Nepal Terai belt, with particular reference to the Balrampur landscape of eastern Uttar Pradesh, which adjoins the Suhelwa Wildlife Sanctuary and lies within the wider conflict geography that extends westward through Katarniaghat to the Dudhwa belt. The landscape can be read as a series of parallel zones running from the Himalayan foothills in the north to the cultivated plains in the south: a band of foothill and bhabar forest; the Terai forest belt and its protected areas; a forest-edge transition zone; and, finally, an extensive mosaic of cropland and village settlement threaded by rivers, streams and ponds (Figure 1).

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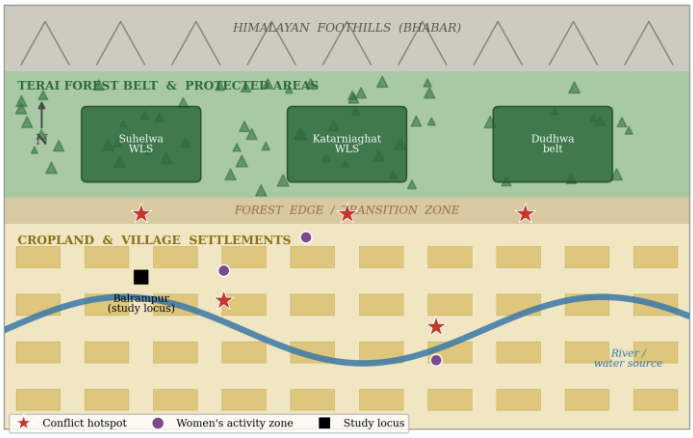

Figure 1: Schematic of the Terai conflict landscape and women's activity zones.

Source: Author's conceptualisation based on regional landscape characteristics.

It is in the transition zone and along the watercourses that conflict is concentrated. Wildlife moving out of the forest to raid crops, and people moving towards the forest edge and water sources to pursue daily livelihoods, meet at these margins. The schematic deliberately marks both the conflict hotspots and the women's activity zones, because it is their overlap that defines the problem this paper addresses.

4.2 METHODOLOGICAL APPROACH

The study adopts a qualitative, synthesis-based approach. It integrates three sources of evidence: a structured review of peer-reviewed literature on human–wildlife conflict and its gender dimensions; regional conflict records and secondary reports pertaining to the Terai protected-area network; and direct field observation of livelihood activity and conflict-prone movement in the Balrampur–Suhelwa landscape. From this evidence base, a conceptual framework of gendered exposure pathways was developed, and a set of indicative, gender-disaggregated assessments was compiled to characterise the division of conflict-exposed labour and the relative intensity of impacts on women. The quantitative profiles presented in Figures 3 and 4 are indicative syntheses drawn from the reviewed literature and field observation rather than the product of a single large-scale survey; they are intended to make visible the structure and direction of gendered exposure rather than to provide precise population estimates. This design is appropriate to an exploratory, framework-building study whose principal aim is to reframe how the costs of conflict in the Terai are understood.

5. RESULTS AND DISCUSSION

5.1 WILDLIFE AND THE NATURE OF CONFLICT IN THE TERAI

The conflict landscape of the Terai involves a characteristic set of species, each associated with a distinct mode of conflict and a distinct point of contact. Table 1 summarises the principal species and the situations in which encounters with women are most likely to occur.

Table 1: Principal conflict species in the Terai and points of contact with women's activities

Species / group	Dominant mode of conflict	Typical point of contact
Asian elephant	Large-scale crop raiding, property damage	Night crop vigils; field paths
Wild boar	Frequent crop raiding, rooting damage	Field guarding; field-edge work
Nilgai & deer	Grazing and trampling of standing crops	Daytime field work; vigils
Tiger & leopard	Attacks on livestock and people	Forest-edge fodder/fuelwood; water points
Sloth bear	Sudden attacks causing severe injury	Fuelwood collection; forest paths

Source: Compiled from regional conflict literature (Madhusudan, 2003; Karanth et al., 2012; Jhala et al., 2020).

The table makes clear a pattern that is central to this study. The species responsible for crop damage are encountered above all during the vigils that protect standing crops, while the carnivores responsible for the most serious injuries are encountered at the forest edge and at water points—exactly the locations to which the collection of fodder, fuelwood and water repeatedly draws women. The mode of conflict and the gendered organisation of labour are therefore tightly coupled.

5.2 THE GENDERED DIVISION OF CONFLICT-EXPOSED LABOUR

The first and most important finding concerns the division of the very tasks that generate conflict exposure. In Terai farming households, water collection and fuelwood collection are predominantly women's responsibilities, while night-time crop guarding is widely shared and fodder collection draws women repeatedly to the forest margin. Men dominate in tasks that are comparatively distant from the moment of encounter, most notably the formal reporting of incidents and the pursuit of compensation. Figure 2 presents this as a conceptual framework, tracing the pathways from the socio-cultural division of labour, through women's livelihood activities and their characteristic exposure points, to the differential burdens that result.

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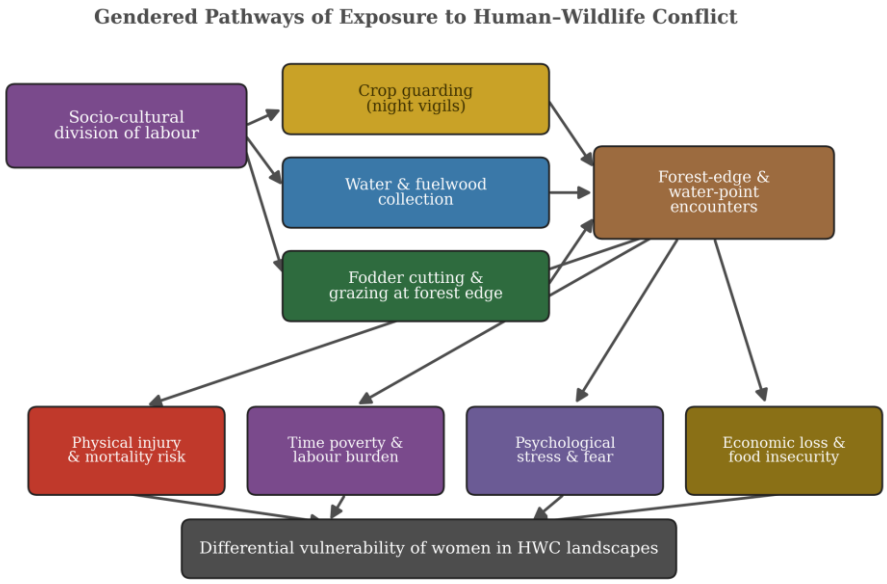

Figure 2: Conceptual framework of gendered exposure pathways in Terai HWC.

Source: Author's framework synthesised from reviewed literature.

The relative distribution of responsibility across conflict-exposed activities is summarised in Figure 3. The pattern is striking: women account for roughly four-fifths of fuelwood and water collection and around two-thirds of fodder collection, and contribute a clear majority of night crop-guarding effort, yet they undertake only about a quarter of the reporting and compensation activity. The implication is that women carry the bulk of the exposure while remaining largely outside the channels through which exposure is formally acknowledged and redressed.

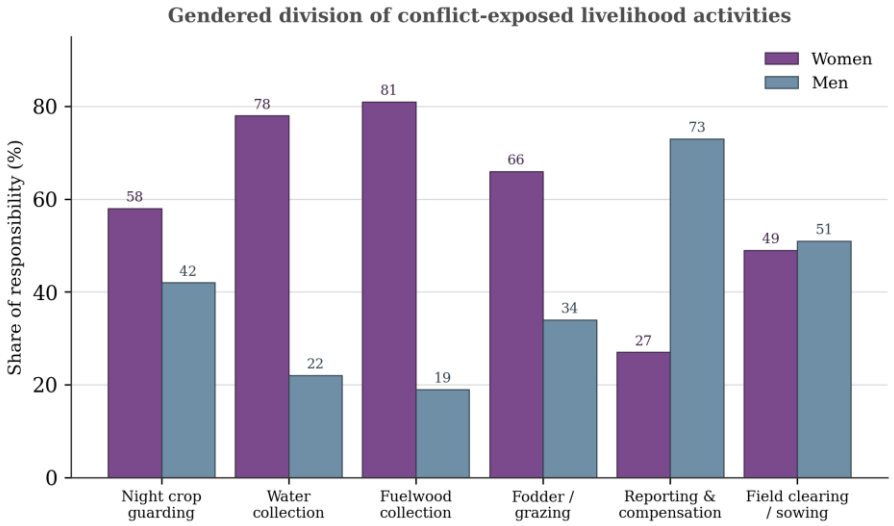

Figure 3: Indicative gendered division of conflict-exposed livelihood activities.

Source: Indicative synthesis from reviewed literature and field observation.

This distribution is not incidental. It reflects entrenched expectations about household roles, in which the provision of water, fuel and fodder is coded as women's work, and the act of guarding crops through the night is shared out of economic necessity. Because these activities are temporally and spatially fixed by their nature—water must be fetched daily, crops must be guarded at the precise hours wildlife is active—women cannot easily avoid the moments of greatest danger. Table 2 sets out how each activity maps onto a specific configuration of exposure.

Table 2: Mapping of women's livelihood activities to conflict exposure

Activity	Timing	Location	Principal hazard
Night crop guarding	Dusk to dawn	Field edge, watch platforms	Elephant, wild boar
Water collection	Early morning, evening	Rivers, ponds, wells	Leopard, snakebite
Fuelwood collection	Daytime, repeated trips	Forest edge, interior margins	Sloth bear, leopard
Fodder cutting / grazing	Daytime	Forest margin, grasslands	Tiger, elephant

Source: Synthesised from Ogra (2008); Barua et al. (2013); field observation.

5.3 THE MULTIDIMENSIONAL BURDEN ON WOMEN

The consequences of this exposure extend well beyond the risk of physical injury, although that risk is itself substantial. Drawing the threads together, the burden borne by women can be understood across several interacting dimensions, summarised in Table 3 and represented as an indicative intensity profile in Figure 4.

Table 3: Dimensions of the impact of human–wildlife conflict on women

Dimension	Manifestation in the Terai context
Physical risk	Injury and mortality during vigils, water and fuelwood collection; snakebite at water sources.
Time burden	Longer or diverted routes to avoid wildlife; sleep loss from night vigils; compounding of an already heavy workload.

Psychological stress	Chronic fear and anxiety associated with forest-edge and night-time activity; trauma following attacks.
Economic loss	Crop and stored-grain loss affecting household food security; medical costs; loss of productive days.
Mobility restriction	Curtailment of movement and of independent activity, especially after dark, narrowing economic and social options.
Educational / social cost	Withdrawal of girls to assist with collection and guarding; reduced participation in community life.

Source: Synthesised from Ogra (2008); Ogra & Badola (2008); Barua et al. (2013); Khumalo & Yung (2015).

Figure 4 renders these dimensions as a single profile, expressing the relative intensity with which each burden is reported in the literature and observed in the field. The profile is weighted most heavily towards time burden, psychological stress and physical risk, with economic loss, mobility restriction and educational or social cost forming a substantial secondary band. The shape of the profile is itself the argument: the costs women bear are dominated by the cumulative, recurring and largely invisible burdens of time, fear and constrained movement, rather than by the dramatic but episodic events that conventional conflict accounting tends to record.

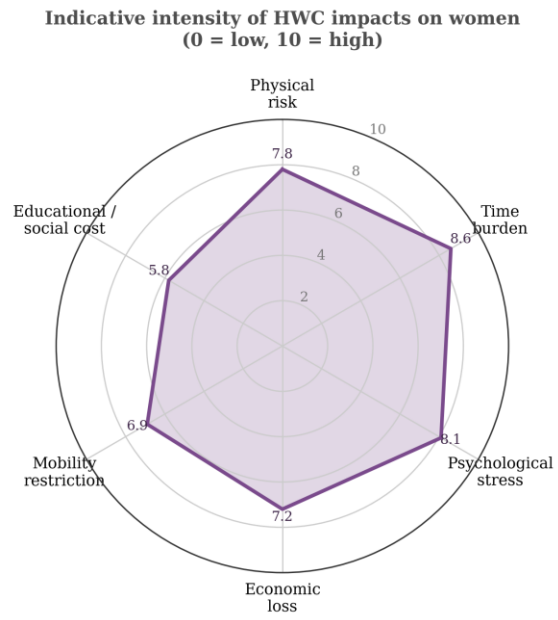

Figure 4: Indicative intensity profile of HWC impacts on women.

Source: Indicative synthesis from reviewed literature and field observation.

5.4 EXCLUSION FROM REPORTING AND COMPENSATION

A recurring theme across the analysis is the disjunction between who bears the cost of conflict and who participates in the systems designed to address it. As Figure 3 indicates, formal reporting and the pursuit of compensation are dominated by men, who typically interact with forest department offices, local officials and documentation processes. Compensation regimes, moreover, are generally calibrated to visible, quantifiable losses—a raided field, a killed animal, a hospitalised victim—and are poorly suited to recognising the time poverty, chronic stress and mobility restriction that constitute much of women's burden (Ogra & Badola, 2008). Table 4 contrasts women's high exposure with their limited participation in, and benefit from, conflict-management mechanisms.

Table 4: Women's exposure versus participation in conflict-management mechanisms

Mechanism	Women's exposure / stake	Women's typical participation
Incident reporting	High (present at most encounters)	Low
Compensation claims	High (bear hidden and direct costs)	Low to moderate
Mitigation infrastructure	High (use water points, paths)	Low (rarely consulted)
Conflict-management committees	High (daily risk-bearers)	Low (under-represented)

Source: Synthesised from Ogra (2008); Khumalo & Yung (2015); Gore & Kahler (2012).

This mismatch has two consequences. First, it renders much of women's suffering statistically invisible, so that policy is formulated on an incomplete picture of the conflict. Second, because the people most familiar with the precise geography and timing of danger are largely excluded from designing responses, mitigation measures are less effective than they could be. Closing this gap is therefore not only a matter of equity but also of effectiveness.

6. POLICY IMPLICATIONS AND THE WAY FORWARD

The analysis points towards a set of gender-responsive measures that would simultaneously reduce women's vulnerability and strengthen conflict management overall. In the domain of basic infrastructure, the provision of safe, proximate water sources community wells, hand pumps or piped supply within the settlement would remove one of the most frequent and hazardous journeys women make, while solar lighting along well-used paths and around water points would reduce the danger of dusk and dawn movement. Similarly, support for alternative fuel and fodder improved stoves, fuel-efficient practices, fodder cultivation and plantation on village

land would lessen the need for repeated trips to the forest edge. In the domain of protection, predator-proof water and bathing enclosures, better-designed watch platforms for crop vigils, early-warning arrangements and escort or group-movement practices can lower the risk attached to activities that cannot be eliminated. In the domain of institutions, the most important reform is the deliberate inclusion of women in conflict-reporting, compensation and management processes: simplifying claims so that women can file them, recognising hidden and indirect costs within compensation frameworks, and reserving meaningful representation for women on local conflict-management committees. Because women hold detailed, practical knowledge of where and when danger arises, their participation would directly improve the targeting of mitigation.

Finally, these measures are most effective when embedded within the broader shift, advocated by Bhatia et al. (2020) and Sharma et al. (2021), from a conflict-centred to a coexistence-centred approach one that treats the reduction of women's specific vulnerabilities not as a peripheral welfare concern but as integral to the long-term sustainability of human–wildlife relations in the Terai.

7. CONCLUSION

This study has argued that the costs of human wildlife conflict in the Terai are borne unevenly within the household, and that women in particular are channelled by the prevailing division of labour into the times and places where encounters with wildlife are most likely. Through the daily collection of water, fuelwood and fodder, and through their substantial contribution to night-time crop protection, women occupy the conflict landscape in a distinctive way, and they carry a multidimensional burden physical, temporal, psychological, economic and social that conventional, aggregate accounts of conflict largely fail to register.

The conceptual framework and indicative profiles developed here are intended to make that hidden burden visible and to show that it is structured rather than random: it follows directly from how livelihood roles are organised. The same analysis reveals a troubling mismatch, in which the women most exposed to conflict are least represented in the systems meant to record and redress it. Addressing this requires more than compensation; it requires safer water access, alternatives to forest-edge resource collection, protective infrastructure and, above all, the genuine inclusion of women in the institutions that govern conflict.

A gender-responsive approach is thus not an optional refinement but a precondition for any equitable and durable model of coexistence in the Terai. Future work would benefit from systematic, gender-disaggregated field surveys across the Terai protected-area network to refine the indicative patterns presented here, and from participatory studies that allow women themselves to define the priorities for reducing the risks they live with every day.

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