© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

Climate Change, Pollinator Displacement and Human–Bee Conflict: A One Health Framework for Emerging Ecological and Public Health Risks

DR AMIT KUMAR AWASTHI
Assistant Professor, Department of Zoology, D.S.N.P.G.College , Unnao

***Abstract-** Reports of mass honey-bee stinging incidents in and around Unnao district, Uttar Pradesh — including a fatal attack during a local cricket match in February 2026 — have renewed attention to a poorly studied interface: the conditions under which honey-bee colonies and human populations come into damaging contact. This paper develops a One Health framework for interpreting such events across three interacting domains — environmental/ecosystem health, pollinator (Apis dorsata) health and behaviour, and human public health — rather than treating each incident as an isolated news item. We synthesise literature on climate-driven pollinator phenology and displacement, giant-honey-bee nesting and migratory ecology, colony defensive-behaviour physiology, and mass-envenomation clinical outcomes, and combine this with a retrospective, source-verified review of the Unnao incidents and comparable Indian events. Because no dataset directly enumerates mass-stinging events against climatic, land-use and demographic covariates, and because primary climate/land-cover/biodiversity datasets could not be retrieved or processed in this study's working environment, we present a structured secondary-data synthesis rather than a fitted statistical or geospatial model. On this basis we propose a conceptual pathway — climate stress and habitat disruption driving pollinator displacement, which increases spatial overlap between colonies and human activity and thus the probability of defensive mass-stinging encounters — and introduce a preliminary, unvalidated Pollinator–Human Conflict Risk Framework and indicative Index (PHCRI) intended to guide future field research, not to serve as an operational tool. We distinguish throughout between established mechanism, plausible hypothesis and unverified media report, and conclude with a multi-stage research programme, conservation- and public-health-oriented recommendations, and a candid account of evidentiary limitations.*

***Keywords:** apis dorsata; climate change; pollinator displacement; human–bee conflict; one health; mass envenomation; habitat fragmentation; uttar pradesh*

I. INTRODUCTION

On the evening of 18 February 2026, a swarm of bees attacked a junior cricket match at Sapru Maidan in Shuklaganj, Unnao district, Uttar Pradesh, killing senior umpire Manik Gupta after between roughly fifty and more than one hundred and fifty reported stings [1-7]. The same season produced comparable reports elsewhere in India: a funeral in Chittorgarh, Rajasthan, at which around twenty mourners were stung and the cremation completed by relatives in protective equipment [8]; a disrupted funeral procession in Pune [9]; a fatal attack on field labourers in Madhya Pradesh [10]; and a fatal roadside attack in Ballia district, also in Uttar Pradesh [11]. Read individually, each is a local human-interest story. Read together, they describe a recurring pattern in which honey-bee colonies — most plausibly, across much of northern India, the giant honey bee Apis dorsata — come into sudden, occasionally lethal contact with people engaged in ordinary social, agricultural and recreational activity.

Case material supplied for this study additionally described a funeral-related attack in the Ajgain Kotwali area of Unnao and an attack on a farmer in the Asiwan police-station area. A systematic search of news coverage (Section 7) corroborated the cricket-ground incident extensively but did not locate independent coverage of the Ajgain and Asiwan events as described. We treat those two as reported case material of unverified status rather than confirmed incidents throughout this paper — a distinction we maintain deliberately, since a paper modelling the ecological plausibility of human–bee conflict must be exactly as confident as its evidence warrants.

We resist the temptation to reach for a single dramatic explanation — that a warming climate is driving bees to attack people. Honey-bee defensive behaviour is a well-characterised response to mechanical and chemical disturbance of a colony, not a direct response to ambient temperature [12], [13]. What a changing climate can plausibly do — and what the pollinator-ecology literature supports — is alter where and when floral resources and nesting substrates are available, changing how far and how often colonies must move [14-22]. Where this brings colonies closer to human settlements, an ordinary act — walking near a nest, pruning a tree, lighting a fire — becomes correspondingly more likely to trigger the colony's well-understood defensive response, with the resulting injury following an entirely conventional physiological mechanism even as the ecological antecedents of the encounter may be changing.

The question this paper addresses is therefore not whether climate change caused the Unnao attacks — a claim no available evidence could support or refute — but how climate-driven ecological change might plausibly alter the distribution and behaviour of giant honey bees in ways that increase the probability of human–bee encounters, and what follows for ecosystem and public health when it does. We keep three evidentiary registers separate throughout: what is established in the literature; what is ecologically plausible but untested for Apis dorsata specifically; and what is merely reported in the press and requires corroboration.

A One Health framing is appropriate because the causal chain crosses ecosystem science, animal biology and human medicine, and because single-domain responses are likely to be counter-productive: Apis dorsata is a significant regional pollinator [23], [24], so indiscriminate colony destruction would undermine agriculture, while ignoring the lethality of mass stinging for vulnerable individuals would be equally inadequate.

1.1 Research gap, objectives and hypotheses

Climate–pollinator phenology research and Apis dorsata field ecology are each reasonably mature literatures, but they are rarely connected to one another or to human–wildlife and public-health risk research; mass-stinging incidents in India are documented, when at all, only in press reports and occasional forensic case studies, essentially never linked to the ecological literature. This paper's contribution is to connect these bodies of work into one appropriately hedged framework and to identify precisely where the connecting evidence is missing.

The study pursues six objectives: to synthesise climate pressures on pollinator ecology; to characterise Apis dorsata displacement, climatic and land-use components; to identify habitat drivers mediating displacement; to characterise human activities that convert colony proximity into conflict; to document and verify the Unnao and comparator incidents; and to propose an integrated, appropriately caveated risk framework. These map onto seven research questions addressing climatic effects on distribution and activity, habitat/floral-resource drivers of displacement, conditions favouring overlap, triggering human activities, hypotheses generated from the Unnao evidence, clinical/public-health consequences, and integration into a testable risk framework.

Five hypotheses, stated for future testing rather than as findings of this review: H1 — greater climatic stress is associated with altered Apis dorsata distribution, nesting-site selection or migratory timing. H2 — greater habitat disturbance is associated with increased colony proximity to human-occupied areas. H3 — reduced or shifted floral-resource availability is associated with changes in foraging or colony-relocation frequency. H4 — greater human activity intensity near suitable habitat increases reported conflict incidence, controlling for colony density. H5 — a composite index combining climatic, habitat, floral-resource, displacement and exposure indicators (Section 10) predicts conflict risk better than any single indicator alone.

II. CLIMATE CHANGE AND POLLINATOR ECOSYSTEM DISRUPTION

2.1 Phenological and distributional responses

The best-documented climate mechanism affecting plant–pollinator systems is phenological mismatch: warming advances flowering in many plants and emergence/foraging in many pollinators, but not by equal amounts, decoupling previously synchronised interactions [14], [16-17], [20]. A systematic review

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

found high-confidence evidence of bee emergence advancing by roughly two and a half weeks, mismatch with floral resources reported in nearly all studies examined, and measurable range contraction in several taxa [22]. Continental-scale European analyses report broad desynchronisation of insect and vegetation phenology under warming [21], and network models show that spatial and temporal mismatch between plants and bee pollinators predicts elevated local extinction risk for the plants concerned [19]; comparable modelling of a specialist crop-pollinator relationship projects substantial range-overlap loss under climate change [18]. A related, less-studied mechanism is spatial: species are expected to shift range poleward or upslope to track thermal suitability, but interacting species need not shift at the same rate, again producing mismatch [15].

This literature was generated almost entirely for temperate bee, butterfly and hoverfly communities in Europe and North America, not for Apis dorsata or the Indo-Gangetic Plain. Extrapolating to a tropical, migratory, colonial bee in northern India is ecological inference, not direct empirical claim, and we flag it as such. The general logic — climate variability perturbing the timing and location of floral resources, to which mobile pollinators respond by altering when and where they forage and nest — is nonetheless a reasonable starting hypothesis for Apis dorsata precisely because its foraging and relocation behaviour is already known, independent of any climate literature, to be tightly coupled to floral bloom (Section 3).

2.2 Heat, moisture extremes and the Indo-Gangetic Plain

Uttar Pradesh sits within the Indo-Gangetic Plain, repeatedly identified as among India's most heatwave-affected regions owing to flat topography, dry continental air influx, and increasingly frequent failures of pre-monsoon cloud cover [25], [26]. IMD classifies heatwave conditions in the plains as maxima ≥40 °C with a departure of 4.5 °C or more above normal, escalating to "severe" beyond 6.5 °C [27]; gridded analyses of eastern Uttar Pradesh (1961–2020) document rising minimum night-time temperatures and declining cold-wave frequency [28], and state climate-planning documentation anticipates a further 1.8–2.1 °C rise in maximum temperature [29]. These are documented meteorological trends, not projections of bee behaviour, and we do not conflate the two: what can be said is that this trend is consistent with, though does not establish, the kind of climatic stress the pollinator-ecology literature elsewhere associates with phenological and distributional disruption. Whether Apis dorsata populations in the region have measurably altered movement timing or nesting-site selection in response is, to our knowledge, an open question that has not been directly studied.

2.3 What is and is not established

It is well established that warming alters flowering phenology and pollinator phenology/range [14-22], and independently well established that Apis dorsata colonies migrate seasonally tracking floral bloom (Section 3). It is plausible, as an extension of these, that climate change could alter the timing or location of that movement, or the availability of nesting substrate relative to human infrastructure. It is not established — because it has not, to our knowledge, been directly studied — that any specific attack, including the Unnao incident, resulted from climate-driven displacement rather than the ordinary, climate-independent probability that a large, conspicuous colony nesting in a shade tree at a public ground will eventually be disturbed. Distinguishing these tiers of confidence is the central analytical discipline this paper maintains.

III. ECOLOGY AND BEHAVIOUR OF APIS DORSATA

3.1 Taxonomy, nesting and floral-resource dependence

Apis dorsata Fabricius, the giant honey bee, belongs to the subgenus Megapis and is the largest of the open-nesting Asian honey bees, distinguishable from the smaller Apis cerana and Apis florea by body size and by its single, large, exposed comb rather than a multi-comb cavity nest [30]. The species ranges across South and Southeast Asia from Pakistan through India, Sri Lanka, China and maritime Southeast Asia [24], [30]. Media reports of "bee attacks" in India essentially never specify species; where this paper attributes the Unnao and comparable incidents to Apis dorsata, this reflects regional prevalence and characteristic large-colony open-nesting habit, not a confirmed

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

identification, and we treat it as a working hypothesis rather than an established fact.

Unlike cavity-nesting Apis mellifera and Apis cerana, Apis dorsata builds a single vertically suspended open comb, typically under a tree branch, cliff, building eave or water-tank underside, often in aggregations of tens to over a hundred colonies at favoured sites [31], [24]. A detailed field study in semi-arid north-west India found roughly one-fifth of colonies nesting on buildings rather than trees, with strong preference for smooth-surfaced, gently inclined supports at heights of roughly fourteen to seventeen metres and east–west orientation [23]. Field surveys in West Bengal describe similar preferences for large trees such as Bombax ceiba and Ficus benghalensis, with substitution onto water reservoirs and building walls — up to several hundred nests at a single site — where such trees are scarce [31]. Two points follow directly: Apis dorsata already nests opportunistically on human structures wherever suitable, so colony presence near settlements is not in itself evidence of recent disruption; and the species' fidelity to a narrow set of structural cues means large-scale loss of traditional nesting trees creates specific pressure toward substitution onto built structures disproportionately close to human activity.

Colony-level activity is tightly coupled to mass-flowering resources: population studies report multi-year abundance fluctuations tracking flowering events, with dwindling pollen resources identified as a proximate trigger for seasonal transitions in brood-rearing activity [32], [24]. Because reproduction proceeds by whole-colony fission and migration rather than gradual supersedure, population dynamics at a site can change relatively rapidly in response to resource pulses, likely amplifying sensitivity to interannual and climate-linked variability in bloom timing.

3.2 Seasonal migration and defensive behaviour

A distinctive feature of Apis dorsata biology, largely absent in temperate bee species and central to any climate-linked displacement argument, is seasonal colony migration. Field and molecular studies across Thailand, India, Nepal, Bhutan and Sri Lanka describe colonies relocating between highland dry-season aggregations and lowland monsoon mass-flowering sites, with migration distances up to roughly two hundred kilometres and evidence, from microsatellite fingerprinting and multi-year revisitation, of fidelity to specific stopover and nesting locations across years [32-34] Bivouacking at stopover sites has been directly re-confirmed across separate multi-year studies at the same Thai site, supporting fixed or learned migration routes rather than diffuse wandering [33], [34]. This is the single most important piece of established biology underpinning the plausibility of a climate–displacement–conflict pathway: if colonies migrate along comparatively fixed routes timed to floral bloom, any climate-driven shift in that bloom has a clear route by which to alter where and when colonies pass through landscapes that contain sports grounds, funeral sites, roads and farmland.

The physiological basis of defensive behaviour is well characterised, principally in Apis mellifera but broadly conserved across Apis species: guard bees respond to mechanical disturbance and dark moving objects by releasing sting alarm pheromone (isoamyl acetate is the principal component), recruiting nestmates into a coordinated, dose-dependent, self-reinforcing stinging response [35], [36]. This provides a physiological explanation for why real-world mass-stinging events can escalate rapidly once initiated, as described in eyewitness accounts of the Shuklaganj incident in which the swarm reportedly "circled" the affected umpire for several minutes [2]. This response is triggered by physical or chemical disturbance of the colony — most commonly human proximity, vibration or interference — not by ambient temperature or humidity as such [12], [13]; climate and habitat change are therefore relevant to this stage of the causal chain only indirectly, by altering how often and where such disturbance occurs.

Taken together, Apis dorsata is already tolerant of nesting substrates within human-modified landscapes, subject to seasonal migration that can bring large colonies through agricultural and peri-urban areas at broadly predictable times, and equipped with a rapid, escalating defensive response once disturbed. None of this is peculiar to a changing climate; what climate change plausibly contributes is pressure on the timing and location of the floral resources structuring migration, and, via extreme heat and altered rainfall, potential additional pressure on traditional nesting substrates. This species-specific biology is best read not as proof of a climate–conflict link but as the mechanistic scaffolding that makes such a link ecologically coherent and worth testing.

IV. POLLINATOR DISPLACEMENT UNDER ANTHROPOGENIC ENVIRONMENTAL CHANGE

Independent of climate change, land-use intensification and urbanisation are leading drivers of pollinator decline and redistribution worldwide [37-38]. Urbanisation and conversion of semi-natural vegetation reduce both extent and connectivity of pollinator habitat, with documented changes in community composition, foraging range and floral specialisation along urbanisation gradients [39-40]. Fragmentation reduces pollen quality and pollinator visitation to threatened plants by restricting specialist-forager movement between remnant patches [41], and agricultural intensification reduces floral-resource abundance and diversity, with downstream effects on pollinator nutrition and foraging behaviour [37], [42]. Analysis of the interaction between climate and land-use pressures found that warming's negative effects on pollinator diversity were more pronounced in anthropogenically modified landscapes than semi-natural ones, suggesting the two stressors compound rather than simply add [38].

For a species with the structurally specific nesting requirements described in Section 3.1 — tall, smooth-barked, shaded trees or comparable substitutes — felling mature trees for timber, urban expansion, road widening or agricultural clearance removes precisely the resource whose scarcity drives substitution onto buildings and water towers close to human activity [23], [31]. This is one of the more directly evidenced links in the causal chain this paper investigates, requiring no appeal to climate change at all, only the well-documented pattern of tree loss accompanying urbanisation and agricultural intensification across the Indo-Gangetic Plain, combined with Apis dorsata's tendency to nest on buildings when tree substrates are scarce.

The urban-pollinator literature does not uniformly describe habitat modification as reducing pollinator presence: in several systems, urban green space and ornamental planting partially substitute for lost semi-natural habitat, and some land-use transitions have increased floral availability [43-44] Displacement is therefore better characterised as redistribution toward anthropogenic landscapes rather than uniform decline — a distinction that matters for the conflict-risk argument, since redistribution toward human-occupied space is, definitionally, redistribution toward greater human exposure regardless of whether total colony abundance is rising, falling or stable.

The proposition that pollinator displacement increases human–bee conflict frequency is ecologically coherent, consistent with human–wildlife conflict research in other taxa where range or habitat-use shifts that increase spatial overlap with human activity are a standard driver of conflict frequency. We are not aware of a published, quantitative test of this displacement–conflict relationship for Apis dorsata using systematically collected incident, land-use and colony-distribution data together, and we label it explicitly as a plausible hypothesis (H2, Section 1.1) requiring direct empirical testing rather than an established finding.

V. ENVIRONMENTAL AND HUMAN DRIVERS OF HONEY-BEE CONFLICT

If pollinator displacement increases the probability that colonies are present near human-occupied landscapes, the second half of the conflict equation is the human activity determining how often and under what circumstances people come into disturbing proximity to those colonies. Several categories recur across the incident reports reviewed for this paper and are consistent with the disturbance-based mechanism of Section 3.2.

Vegetation disturbance and infrastructure activity — pruning, felling and construction near existing colonies — is among the most direct triggers, since it involves physical vibration of the nest substrate; such activity is simultaneously a driver of the tree loss that may push colonies toward substitute, human-proximate nesting sites (Section 4). Agricultural activity routinely brings workers into proximity with vegetation or structures that may host colonies, particularly along the Indo-Gangetic Plain's densely cultivated, tree-dotted field margins; comparator

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

incidents involving farm labourers in Madhya Pradesh and a fatal Texas field attack illustrate the cross-regional pattern of routine field work as a proximate trigger [10], [45], [46].

A striking feature of the incident set is the recurrence of large outdoor gatherings — cricket matches, funerals, religious observances — as settings for mass-stinging events, evident in the Unnao cricket-ground case and in independently documented funeral attacks in Rajasthan and Maharashtra, a religious-gathering attack in Karnataka, and a further funeral-related fatality in Madhya Pradesh [8], [9], [45]. This pattern most plausibly reflects exposure rather than any special attractiveness of gatherings to bees: such events assemble large numbers of people, often including children and elderly or infirm individuals with reduced capacity to flee, at outdoor sites — shaded cricket grounds, cremation grounds — that independently offer the structural features Apis dorsata favours for nesting. Several reports implicate incidental disturbance (smoke, a thrown stone) as the immediate trigger [47], consistent with Section 3.2's mechanism.

Simple pedestrian or vehicular movement near a colony recurs as a triggering circumstance independent of deliberate disturbance, including the Ballia district incident in which passers-by were attacked without any reported active disturbance [11] — underscoring that colony proximity alone carries background risk once a colony is established near a thoroughfare, and that risk is a joint function of colony location and the density and pattern of human movement through it, precisely the joint dependency the PHCRI framework (Section 10) attempts to formalise.

VI. ONE HEALTH DIMENSIONS OF HUMAN–BEE CONFLICT

The One Health approach, articulated by the WHO/FAO/WOAH/UNEP Quadripartite collaboration and national frameworks such as the US CDC's National One Health Framework, treats human, animal and environmental health as interdependent domains requiring coordinated analysis rather than sequential, single-sector management [48-50]. Although One Health scholarship has historically concentrated on zoonotic infectious disease, its conceptual core — that human health outcomes are frequently downstream of animal and ecosystem states shaped by anthropogenic environmental change — applies without modification to human–bee conflict, and recent framework-development work has argued for extending One Health analysis beyond its infectious-disease origins to this broader class of interaction [51-53].

At the environmental level, relevant variables are climatic regimes, land cover (tree cover, agricultural and built-up area) and floral-resource availability — reviewed in Sections 2 and 4 as shifting across the Indo-Gangetic Plain and as established drivers of pollinator change elsewhere. At the animal level, relevant variables are colony stability, nesting-site availability, foraging range, migratory timing and disturbance-triggered defensive behaviour (Section 3); colony-level stress from agrochemical or other contaminant exposure is a recognised general concern for Apis species, though we did not identify Apis dorsata-specific evidence bearing on defensive-behaviour thresholds, which we flag as a research gap rather than an established effect.

At the human level, relevant variables are exposure-event frequency and the clinical burden of envenomation. Case-report literature documents a dose–response relationship between sting count and severity: fifty to two hundred stings carry elevated risk of renal injury, two hundred to five hundred risk of multi-organ failure, and above five hundred high risk of death, separate from the dose-independent risk of IgE-mediated anaphylaxis fatal after a single sting in sensitised individuals [54-56]. Reported sting counts for the Unnao umpire — variously "more than fifty" and "more than one hundred and fifty" [2], [5] — sit within or above the range associated with substantial systemic risk, and his reported pre-existing cardiac condition [5] is consistent with, though not proof of, the recognised elevated vulnerability of older adults with cardiovascular comorbidity [56-58]. Postmortem literature describes the pathological signature of fatal bee-sting anaphylaxis used to establish cause of death in such cases [54], [58], underscoring that mass-stinging fatalities are a recognised, mechanistically well-characterised clinical entity.

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

Presenting these three domains together makes explicit where interventions in one create consequences in another: destroying a colony reduces immediate human risk but removes a pollination resource and, if indiscriminate, may push remaining colonies toward other human-proximate sites; protecting all colonies regardless of location ignores the acute, sometimes fatal, human-health risk documented above. Section 13 develops recommendations that attempt to hold both concerns simultaneously.

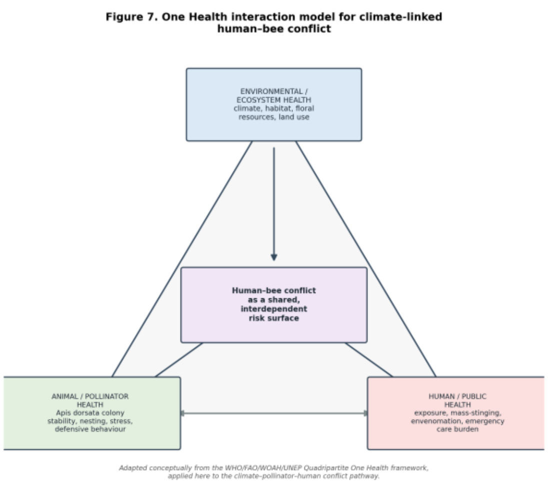

Figure 7. One Health interaction model for climate-linked human–bee conflict. Adapted conceptually from the WHO/FAO/WOAH/UNEP Quadripartite One Health framework [48], [49].

VII. CASE EVIDENCE FROM REPORTED MASS HONEY-BEE INCIDENTS IN UNNAO, UTTAR PRADESH

7.1 Search strategy

A structured web search was conducted for coverage of honey-bee attacks in Unnao district, Shuklaganj, Ajgain and Asiwan localities, and comparable events elsewhere in India for context, prioritising the original report and cross-checking factual details across multiple independent outlets. No attempt was made to access social-media reposts or unverifiable aggregator content.

7.2 The Shuklaganj cricket-ground incident: corroborated, with discrepant detail

The cricket-ground incident is the most extensively corroborated case material considered here. Regional (Tribune, ETV Bharat, India TV News), national (Outlook India) and international wire-derived coverage (Gulf News, The Independent/PTI) agree on the core facts: a swarm attacked players, officials and spectators at a junior (Under-13) league match at Sapru Maidan, Shuklaganj, on the evening of 18 February 2026; umpire Manik Gupta was stung repeatedly, collapsed, was taken first to a private hospital and then referred to LLR Hospital, Kanpur, where he was declared dead; other players and a second umpire were also stung [1-7]. This cross-source agreement is what allows the incident to be treated as independently verified rather than merely reported.

The reports diverge on specific details: Gupta's age is given as sixty in one outlet and sixty-five in several others [1], [3], [4], [59]; injured-player counts range from "ten to fifteen" to "fifteen to twenty" [3-5]; reported sting counts on Gupta range from "more than fifty" within about ten minutes to "more than one hundred and fifty" [5], [59]; one report alone states a pre-existing heart condition and a forty-five-minute traffic delay to hospital [5]. We report these discrepancies explicitly rather than silently selecting the most convenient version, and treat the sting count as uncertain within the reported range for the clinical discussion in Section 6.

7.3 Ajgain and Asiwan: reported but not independently corroborated

The supplied case material additionally described a funeral-related attack in Ajgain (twenty to twenty-five injured) and an attack on a farmer in Asiwan. Our search did not locate independent coverage corroborating either under the location, date or casualty details supplied — possibly reflecting genuine under-reporting of smaller local incidents (Section 14), possibly an error in the source material; the search cannot distinguish between these. We retain both as reported case material and candidate entries for a future retrospective inventory, but exclude them from the comparative clinical and quantitative discussion in Sections 6 and 9, where only independently corroborated incidents are used.

7.4 Comparable incidents identified for context

The same search identified independently reported incidents elsewhere in India used for comparison in Table 2 and Figure 4: a funeral attack injuring roughly twenty in Chittorgarh, Rajasthan, after which the cremation was completed by relatives in protective equipment [8]; a funeral-procession attack in Pune, Maharashtra, with injuries but no fatality [9]; a fatal attack on agricultural labourers in Morena, Madhya Pradesh [10]; a fatal roadside attack on pedestrians in Ballia, Uttar Pradesh [11]; and a fatal attack on mourners returning from a funeral in Dhar, Madhya Pradesh [45]. Older, well-documented incidents — forty injuries during Bakrid prayers in Karnataka after a thrown stone dislodged a hive [47], and a bee attack disrupting the Thiruvananthapuram collectorate after a bomb-squad search inadvertently disturbed a hive [60] — illustrate the range of triggering circumstances documented in India, though temporally distant from the Unnao cluster.

Table 2. Documented mass-stinging incidents identified through systematic search and used in this study (independently corroborated events only; Ajgain and Asiwan excluded pending verification).

Date	Location	Setting / activity	Reported casualties	Death reported	Verification status	Source(s)
18 Feb 2026	Shuklaganj, Unnao, UP	Under-13 cricket match	1 death; ~10–20 injured (range across sources)	Yes – umpire Manik Gupta	Corroborated – 6 independent outlets	[1]–[7]
21–24 Feb 2026	Chittorgarh dist., Rajasthan	Funeral / cremation	~20–25 injured	No	Single detailed report; internally consistent	[8]
3 Aug 2026	Ambegaon, Pune dist., Maharashtra	Funeral procession	Several injured (n.s.)	No	Single detailed report	[9]
23 Mar 2024	Ambah, Morena dist., Madhya Pradesh	Agricultural field labour	1 death; 4 injured	Yes	Corroborated – 2 outlets	[10]
n.d.	Narhi, Ballia dist., Uttar Pradesh	Roadside / pedestrian	1 death; 2 injured	Yes	Single detailed report (police-sourced)	[11]
n.d.	Bag, Dhar dist., Madhya Pradesh	Returning from funeral	1 death; 4 injured	Yes	Single detailed report (police-sourced)	[45]
27 Oct 2012	Saraguru village, Karnataka	Bakrid (Eid al-Adha) prayers	~40 injured	No	Single contemporaneous report	[47]
18–19 Mar (year n.s.)	Thiruvananthapuram, Kerala	Government collectorate office	~75 stung	No	Single detailed report	[60]

This is a purposive, search-derived sample, not a systematic or exhaustive census, and cannot support estimates of incidence, trend or relative frequency of triggering activities — that would require the systematic surveillance discussed in Section 12. Its function is illustrative and comparative: the Unnao cricket-ground event, however striking, sits within a recognisable pattern of Indian mass-stinging incidents clustered around funerals, agricultural work and outdoor gatherings rather than being sui generis.

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

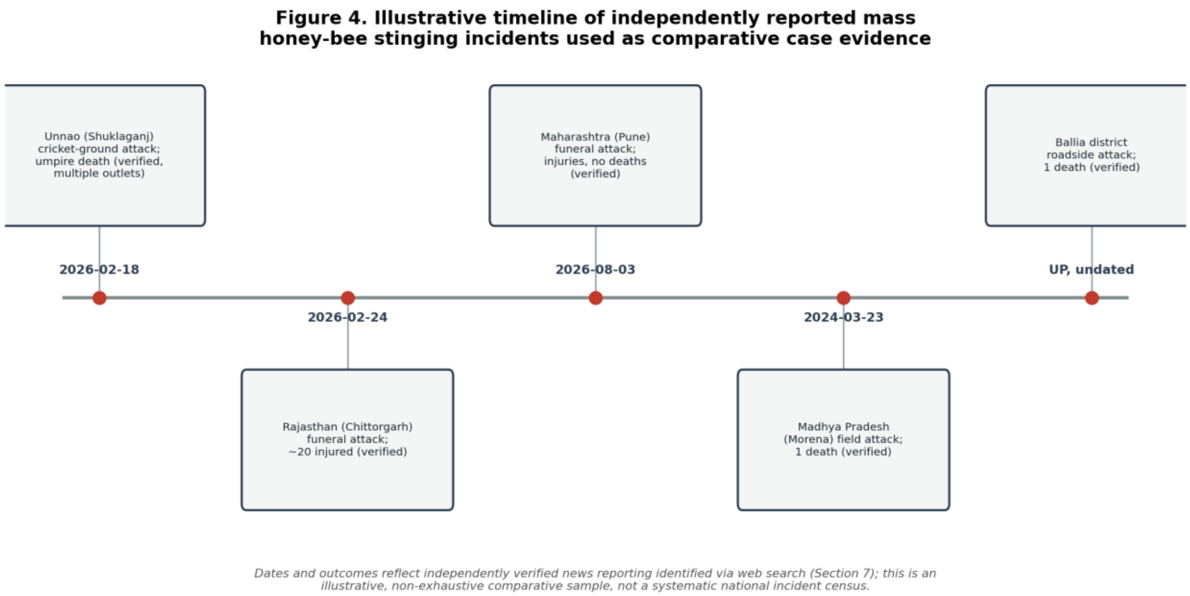

Figure 4. Illustrative timeline of independently reported mass honey-bee stinging incidents used as comparative case evidence (search-derived, non-exhaustive sample).

7.5 What these reports can and cannot tell us

The reports establish, to a standard adequate for scientific citation, that mass honey-bee stinging events recur in India across rural and peri-urban settings, and that outdoor gatherings, funerary activity and agricultural work are recurrent triggering contexts. They establish nothing about the ecological antecedents of colony presence — whether colonies were recently displaced, long-established or unusually large — because none contain the entomological, meteorological or land-use information required to assess such claims; none contains confirmed species identification, colony age or size, or local climatic conditions preceding the incident. The reports are adequate evidence of the human-health outcome and its social setting, and inadequate evidence of the ecological mechanism this paper is concerned with — precisely the gap motivating Sections 9, 12 and 15.

VIII. DATA SOURCES AND ANALYTICAL FRAMEWORK

8.1 Search for an existing dataset

We searched for public data resources supporting a quantitative test of the climate–displacement–conflict pathway: GBIF and the India Biodiversity Portal for Apis dorsata occurrence records [61-62]; IMD gridded meteorological products; global bioclimatic and land-cover products (WorldClim, CHELSA, MODIS/Landsat); and any existing structured human–wildlife conflict database for India. No dataset was identified that enumerates mass honey-bee-stinging incidents against geographic, temporal, climatic and land-use covariates in a form suitable for modelling — a genuine gap in public data infrastructure, consistent with the research gap identified independently in Sections 2–6.

8.2 What was and was not achievable in this study

We attempted to query the GBIF occurrence API directly for Apis dorsata records from India as a genuine test of primary-data access. The query executed but the network configuration available to this study did not correctly apply the requested species/country filters and instead returned unrelated European taxa records, confirming that reliable programmatic access to primary biodiversity, climate or land-cover repositories was not available in this working environment. We report this outcome transparently rather than substituting fabricated figures, and rather than presenting a nominally "downloaded" dataset that was not, in fact, usable.

Accordingly, and in direct accordance with the instruction that a manuscript should be transparently

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

framed as review-based where primary empirical analysis is not achievable, this paper is presented as an integrative literature review combined with a retrospective, source-verified synthesis of media-reported incidents (Section 7), not as a fitted statistical or geospatial model. No regression coefficients, p-values, correlation statistics or geospatial risk surfaces appear anywhere in this paper, because none were legitimately produced. Quantitative figures presented are either drawn directly from cited literature and attributed as such, descriptive counts of the incident set explicitly labelled non-systematic, or conceptual/schematic diagrams displaying no invented numerical data (Figures 1–3, 5–7; Figure 4 plots real dates from verified sources only).

8.3 Candidate data sources for future quantitative work

For the research programme in Section 15, the most appropriate identified resources are: GBIF/India Biodiversity Portal occurrence records for Apis dorsata, noting their opportunistic, observer-biased coverage [61-62]; IMD gridded daily temperature data for climatic covariates [28]; MODIS/Landsat land-cover and NDVI for floral-resource and land-use proxies; and Census of India district/block statistics for human-exposure covariates. None were accessed as primary data for this study; they are specified here as a methods target for future work.

IX. ENVIRONMENTAL AND SPATIAL ASSESSMENT

Given the data-access constraints of Section 8, this section presents only what the available evidence legitimately supports: a synthesis of published environmental-driver relationships (Table 1) and a qualitative reading of the verified incident set (Table 2, Figure 4).

Table 1. Environmental drivers and their hypothesised effects on pollinator ecology, with evidentiary status.

Environmental driver	Mechanistic pathway	Hypothesised effect on pollinator ecology	Evidentiary status
Rising mean / night-time temperature	Alters thermal suitability of nesting sites; may advance phenology	Shift in nesting-site selection or colony activity timing	Established for pollinators generally [14], [15], [16], [17]; not tested for A. dorsata
Heatwave frequency / intensity	Acute thermal stress on exposed open-comb nests	Possible colony relocation or absconding under extreme heat	Plausible; A. dorsata's exposed nesting habit is distinctive but untested
Altered monsoon timing / rainfall variability	Shifts flowering timing of monsoon-dependent flora	Mismatch between migratory arrival and floral bloom	Established mechanism in phenology literature [19], [20], [21]; regional test lacking
Drought	Reduces floral resource abundance	Increased foraging range; earlier colony migration/absconding	Plausible extension of established resource-tracking behaviour [32], [24]
Tree loss / deforestation	Removes preferred nesting substrate	Substitution nesting on buildings, water towers	Directly supported by nesting-ecology field studies [23], [31]
Agricultural intensification	Reduces floral diversity and bloom continuity	Reduced resource reliability; altered foraging/migration	Established in general pollinator land-use literature [37], [42], [38]
Urbanisation / built-up expansion	Fragments habitat; creates novel nesting substrates	Redistribution toward peri-urban/urban sites	Established for pollinators generally [39], [40]; A. dorsata-specific data limited

9.1 Qualitative reading of the incident set

The seven verified incidents span February through August across Uttar Pradesh, Rajasthan, Maharashtra, Madhya Pradesh, Karnataka and Kerala — a spread consistent with Apis dorsata's broad subcontinental distribution rather than a single-region anomaly. The February timing of the Shuklaganj incident falls within the dry season, when Apis dorsata colonies in much of northern India are, per Section 3.2, more likely present at lower-elevation, agriculturally proximate sites, consistent with but not establishing a seasonal-exposure explanation. A sample of seven search-derived incidents cannot support claims about seasonal or geographic incidence patterns beyond this cautious observation, and we do not attempt trend, regression or clustering analysis on data of this size and provenance.

9.2 What could not be assessed

We could not assess, for any incident, antecedent temperature or rainfall anomalies, local land-cover change, colony age or size, or confirmed species identity. We could not construct an exposure denominator — for instance, the number of outdoor cricket matches, funerals or field-labour days occurring across Uttar Pradesh without incident over the same period — needed to determine whether the observed incidents represent an elevated conflict rate relative to any baseline, as opposed to the ordinary low background rate of a recognised but uncommon hazard. This absence of a denominator is, in our judgement, the single most consequential limitation of the current evidence base, and closing it is the first priority of the research programme in Section 15.

X. PROPOSED POLLINATOR–HUMAN CONFLICT RISK FRAMEWORK AND PHCRI

Drawing together Sections 2–9, we propose a conceptual Pollinator–Human Conflict Risk Framework structured around five interacting components (Figures 1, 6). We emphasise at the outset that this framework and its indicative index (PHCRI) are conceptual proposals for future field validation — not validated predictive tools, not fitted to any incident dataset, and not suitable for operational risk classification or resource-allocation decisions in their present form.

The framework represents conflict risk as arising from the joint action of climatic stress, habitat disruption, floral-resource change and pollinator displacement on the ecological side, combined with human exposure on the human-activity side, with their interaction elevating disturbance probability and thereby defensive mass-stinging risk and downstream health consequences. Each component would be operationalised as a locally normalised sub-index (Table 4) rather than an absolute quantity, since relevant baselines are necessarily landscape- and season-specific.

Table 4. Potential indicators for the proposed Pollinator–Human Conflict Risk Index (PHCRI). Indicative only; final variable selection requires the field and remote-sensing validation programme of Section 15.

Component	Indicative variables (illustrative, not exhaustive)	Candidate data source
Climate Stress Index (C)	Heatwave frequency; departure of seasonal Tmax/Tmin from normal; rainfall anomaly; drought index	IMD gridded products; WorldClim/CHELSA normals
Habitat Disruption Index (H)	Rate of tree-cover loss; built-up area expansion; road-density change	MODIS/Landsat land-cover time series; state forest department records
Floral-Resource Change Index (F)	NDVI seasonal amplitude/timing; flowering-crop calendar shifts; forest fragment size	MODIS NDVI; agricultural department crop calendars
Pollinator Displacement Proxy (P)	Density/trend of A. dorsata occurrence records; nesting-substrate availability index	GBIF/India Biodiversity Portal occurrence records; field nest surveys

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

Component	Indicative variables (illustrative, not exhaustive)	Candidate data source
Human Exposure Index (E)	Population density; frequency of outdoor public events; agricultural labour intensity; settlement proximity to tree cover	Census of India; district event/permit records; land-use maps

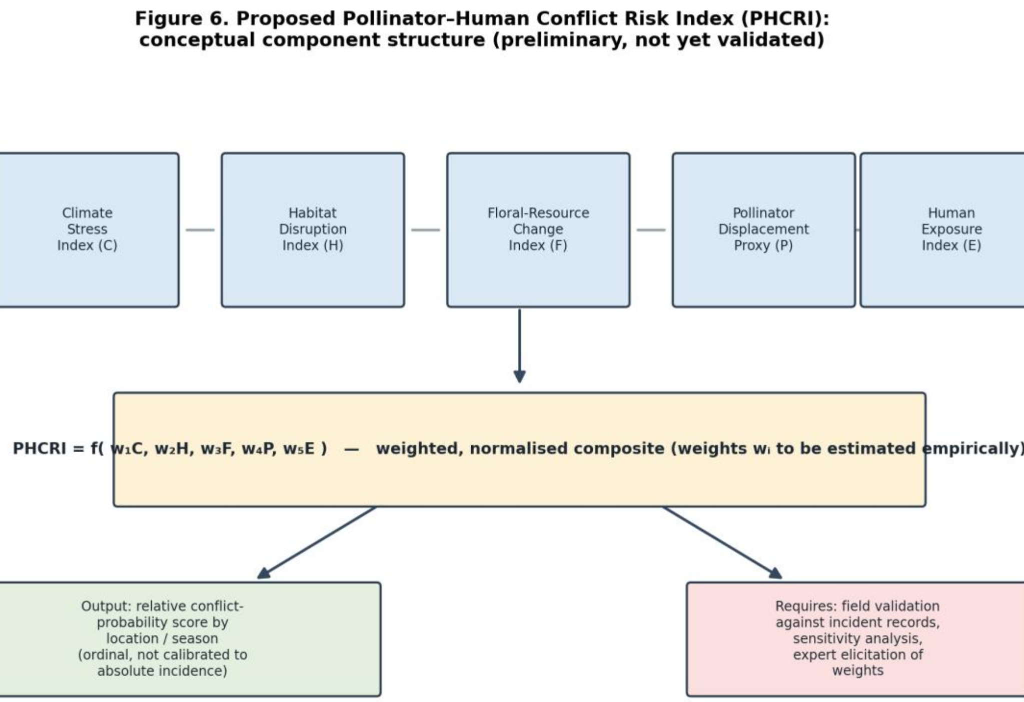

Figure 6. Proposed PHCRI conceptual component structure. PHCRI = $f(w_1C, w_2H, w_3F, w_4P, w_5E)$ is illustrative; weights w_i are unknown and require empirical estimation, not assumption.

10.1 Weighting and validation

We deliberately propose no specific numerical weights, since doing so absent any fitted incident dataset would misrepresent an arbitrary choice as empirically grounded. A defensible path would involve either formal expert elicitation among apiculture, entomology and public-health specialists, explicitly documented as such, or statistical estimation once a retrospective incident dataset of adequate size and coverage has been assembled (Section 15, Stage 1) and matched against Table 4's covariates. Before any operational use the index would require retrospective validation against a systematically collected (not media-derived) incident dataset, prospective validation against subsequently observed outcomes, sensitivity analysis across weighting schemes, and engagement with apiculture and forestry authorities to confirm it does not create incentives for indiscriminate colony destruction in high-scoring areas, contrary to the conservation principles of Section 13. Until these steps are completed, the framework's value is heuristic and organisational rather than predictive.

XI. DISCUSSION

The evidence assembled here supports a coherent, mechanistically plausible pathway from climatic and land-use change to elevated human–bee conflict risk, built from well-established component mechanisms — pollinator phenological/distributional sensitivity to climate (Section 2), Apis dorsata's resource-tracking

© SEP 2026 | IRE Journals | Volume 10 Issue 3 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV10I3-1723057

migration and disturbance-triggered defence (Section 3), displacement toward anthropogenic landscapes under habitat pressure (Section 4), and the clinical severity of mass envenomation (Section 6) — none individually novel. This paper's contribution is the explicit argument for why these previously separate literatures describe successive links in one causal chain, demonstrated via the Unnao case material as a specific, dated, located human-health event.

Nothing in the available evidence demonstrates that any specific attack, including the Shuklaganj fatality, was the product of climate-driven displacement as opposed to the ordinary, climate-independent background risk of a long-established colony nesting, as Apis dorsata routinely does, in a shade tree at a public ground's margin. The paper's central empirical claim is therefore necessarily modest: the ecological preconditions for increased conflict — pollinator sensitivity to climatic and floral-resource change, and demonstrated relocation onto human-proximate structures under habitat pressure — are established generally and plausible for the Indo-Gangetic Plain, and the reported incident pattern is consistent with, though not proof of, this pathway operating in the region.

Treating displacement as redistribution rather than decline (Section 4) matters: if Apis dorsata populations in Uttar Pradesh are stable or increasing overall but concentrating in peri-urban and agricultural landscapes because forest nesting habitat is contracting, conflict risk could rise without any change in total abundance or measurable climate signal — a scenario in which land-use policy, not climate policy, is the more directly relevant lever. Disentangling the relative contribution of climatic and land-use drivers is therefore a first-order question for the research programme (Section 15), since the two point toward different interventions.

Finally, the news discrepancies documented for the Shuklaganj incident and the absent corroboration for Ajgain and Asiwan (Section 7) illustrate a broader point: media reporting, however extensive, is not a substitute for systematic incident surveillance. Any future attempt to quantify human–bee conflict trends in India needs a purpose-built reporting and verification mechanism (Section 12) rather than retrospective news-archive search, which this study shows can both under-detect real events and fail to resolve factual disagreement between sources.

XII. RESEARCH GAPS AND FUTURE DIRECTIONS

Section 1.1 identified the overarching gap this paper addresses: limited integration between pollinator-ecology and human-health/risk research. Table 6 disaggregates this into specific sub-gaps, each linked to a proposed study type; the sequenced research programme addressing several in order is developed fully in Section 15.

Table 6. Research gaps identified in this review and proposed future studies.

Research gap	Why it matters	Proposed study type
No systematic (non-media-derived) incident surveillance for human–bee conflict in India	Prevents estimation of incidence, trend, or exposure-adjusted risk (Sec. 9.2)	Structured reporting mechanism via health-facility and forest-department records (Sec. 15, Stage 1)
No confirmed species identification linked to reported incidents	Cannot confirm A. dorsata attribution assumed throughout Sec. 3, 7	Field/forensic protocol for post-incident species confirmation
No direct test of climate–displacement relationship for A. dorsata	Central mechanism (Sec. 2–4) remains extrapolated from other taxa/regions	Multi-year field monitoring of colony phenology vs. climate covariates (Sec. 15, Stages 2–3)
No displacement–conflict quantitative test	H2 remains an untested hypothesis	Landscape-scale study linking colony distribution to incident locations

Research gap	Why it matters	Proposed study type
No integrated public dataset linking climate, land use and conflict incidents	Prevents PHCRI estimation/validation (Sec. 10)	Construction of linked retrospective database (Sec. 15, Stage 1)
Limited understanding of contaminant effects on A. dorsata stress/defensive thresholds	Potential confounder of "climate" attribution (Sec. 6)	Controlled or observational toxicological–behavioural study
No clinical registry of bee-envenomation cases in Indian hospitals	Public-health burden currently estimated only from case reports (Sec. 6)	Multi-site emergency-department surveillance registry

XIII. CONSERVATION AND PUBLIC-HEALTH RECOMMENDATIONS

Recommendations follow the One Health logic of Section 6: interventions confined to a single domain risk displacing rather than resolving the problem. We deliberately avoid recommending indiscriminate colony destruction as a default, both because Apis dorsata is an ecologically and agriculturally important pollinator [23], [24] and because, per Section 4, removing colonies without addressing the habitat pressures driving their presence near human activity may simply relocate rather than reduce risk at the landscape scale.

13.1 Colony management, risk mapping and agricultural safety

Where colonies occupy low-traffic locations, in-situ protection or professional relocation by trained apiarists is preferable to destruction; retaining mature, large-canopy trees in field margins and peri-urban green space would reduce pressure toward building-nesting. Where removal from active public venues is necessary, it should occur outside event hours by trained personnel, minimising the disturbance most likely to trigger defence. Sports grounds, funeral and religious venues that regularly host large gatherings would benefit from periodic pre-event inspection for active colonies, particularly around mature trees — a low-cost measure directly responsive to the pattern in Table 2 — paired with public-awareness material on safe behaviour if a swarm is encountered (moving away rather than swatting, covering the head, avoiding water as refuge given the drowning risk noted in at least one reviewed incident [8]). Agricultural-extension programmes could incorporate basic colony-recognition and field-margin tree-management guidance alongside existing safety training, given the recurrence of agricultural settings among comparator incidents.

13.2 Emergency preparedness and institutional coordination

Outcome after massive envenomation depends substantially on time to definitive care; the Shuklaganj case, in which the victim was moved between two facilities before reaching capable treatment [5], illustrates the practical stakes of local emergency-care capacity. Strengthening first-responder and primary-hospital capacity for multi-sting envenomation — ready epinephrine access and clear protocols for suspected multi-organ involvement — is directly actionable independent of any resolution of the ecological questions. None of these measures can be implemented effectively without coordination between forest/environmental authorities (colony management, habitat policy) and public-health/emergency-management authorities (medical response, public advisories) — precisely the cross-sectoral coordination the One Health framework of Section 6 is intended to formalise, and which appears, from the fragmented single-agency sourcing of the incident reports reviewed here, to be currently limited or informal.

XIV. LIMITATIONS

This study has substantial limitations. Media-reporting bias is pervasive: coverage is more likely for events involving death or dramatic circumstances than for less newsworthy non-fatal incidents, almost certainly under-representing the true incidence of human–bee conflict, potentially including the Ajgain and Asiwan events (Section 7.3). Species identification is inconsistent to non-existent across all reviewed reports, so the Apis dorsata attribution used throughout is a plausibility-based working assumption, not a confirmed fact. Geographic information is imprecise, generally naming a locality or police-station jurisdiction rather than coordinates suitable for spatial analysis, and no individual colony-level data — size, age, prior disturbance history — exists for any incident. It is not possible, with available evidence, to separate the relative contributions of climatic and land-use change, since both operate on similar timescales and directions in the study region; this confounding is fundamental to any observational, non-experimental approach, including the field programme proposed in Section 15. The verified incident set (Table 2) has narrow, non-systematic temporal coverage, precluding trend analysis, and remote-sensing land-cover/vegetation proxies, where used in future work, carry well-known limitations distinguishing floral-resource quality from generic greenness. Assigning causation for any individual incident, as opposed to describing a plausible contributing pathway, is not possible with retrospective, non-experimental evidence of this kind, and this paper has deliberately avoided doing so. Finally, no clinical-level, hospital-based dataset of Indian bee-envenomation cases was available; the clinical discussion in Section 6 rests on case reports and small series rather than a systematic registry, itself identified as a research gap in Table 6. Future research (Section 15) could address these limitations through purpose-built incident surveillance with mandatory species confirmation, systematic linkage of confirmed incidents to contemporaneous climate/land-cover data, and prospective rather than retrospective data collection.

XV. CONCLUSION AND FUTURE RESEARCH PROGRAMME

This paper examined, with consistently maintained caution about the boundary between established mechanism and untested hypothesis, how climate-driven ecological change might plausibly alter the distribution and behaviour of giant honey bees in ways that increase human–bee conflict probability, and what follows for ecosystem and public health. The individual mechanistic links — climate sensitivity of pollinator phenology and distribution, Apis dorsata's resource-tracking migration and disturbance-triggered defence, its tendency to substitute human-proximate nesting structures where traditional habitat is lost, and the well-characterised clinical severity of mass envenomation — are each independently well supported, even though the integrated pathway connecting them, and its specific operation in the Unnao case, remains an untested hypothesis. The Unnao cricket-ground fatality, extensively corroborated even as sources disagree on specific details, together with a recurring pattern of comparable Indian incidents clustered around funerals, agricultural work and outdoor gatherings, provides motivating case evidence for this hypothesis without constituting proof of it. The proposed One Health framework and the deliberately unvalidated PHCRI are offered as a structure for organising the field, climatic, land-use and clinical data collection needed to move this question from plausible hypothesis to tested finding.

We propose an eight-stage research programme, sequenced so each stage's outputs feed the next. Stage 1: systematic retrospective review of media, forensic and hospital records to construct a verified, geocoded incident database, extending the Section 7 approach. Stage 2: field surveys of Apis dorsata colonies across stratified Uttar Pradesh landscapes (forested, agricultural, peri-urban, urban) to establish baseline nesting density, substrate type and seasonal presence. Stage 3: paired environmental measurement at surveyed sites, linked to IMD gridded products. Stage 4: floral-resource monitoring across at least one, ideally multiple, annual cycles. Stage 5: human-activity and exposure mapping combining Census data with event and agricultural calendars. Stage 6: behavioural observation of colony defensive-response thresholds under controlled, ethically approved protocols, to test whether environmental stress indicators relate to defensive-response intensity. Stage 7: statistical modelling linking Stages 1–6 using generalised linear or mixed models appropriate to count or binary conflict outcomes, with spatial statistics where autocorrelation is evident; ecological niche modelling could characterise current and projected climatic suitability for nesting, and simple temporal forecasting could be explored once Stage 1 yields an adequate time series — machine-learning methods are not recommended at this stage given anticipated sample sizes and the priority of interpretable, mechanistically grounded models. Stage 8: retrospective and, where feasible, prospective validation of the PHCRI (Section 10) against the Stage 1 database, including weighting and sensitivity analysis.

REFERENCES

[1] ETV Bharat, "Umpire Dies, Several Players Injured In Bee Attack Amid Cricket Match In Unnao," Feb. 19, 2026. [Online]. Available: https://www.etvbharat.com/en/state/umpire-dies-several-players-injured-in-bee-attack-amid-cricket-match-in-unnao-enn26021903083

[2] "Veteran umpire Manik Gupta dies after bee attack during junior league cricket match in Shuklaganj, Unnao," *Ground News* (aggregating Times of India reporting), Feb. 19, 2026. [Online]. Available: https://ground.news/article/veteran-umpire-manik-gupta-dies-after-bee-attack-during-junior-league-cricket-match-in-shuklaganj-unnao_6434d6

[3] The Tribune, "Umpire dies, 15-20 players injured in bee attack during cricket match in Unnao," Feb. 19, 2026. [Online]. Available: https://www.tribuneindia.com/news/uttar-pradesh/umpire-dies-15-20-players-injured-in-bee-attack-during-cricket-match-in-unnao

[4] Outlook India, "Umpire Dies, 15-20 Players Injured In Bee Attack During Cricket Match In Unnao," Feb. 2026. [Online]. Available: https://www.outlookindia.com/sports/cricket/umpire-dies-bee-attack-15-20-players-injured-unnao

[5] TheHealthSite.com, "Unnao Bee Tragedy: Cricket Umpire Dies After 150 Stings. How Risky Is It?," Feb. 25, 2026. [Online]. Available: https://www.thehealthsite.com/diseases-conditions/unnao-bee-tragedy-cricket-umpire-dies-after-150-stings-how-risky-is-it-1304263/

[6] Gulf News, "Umpire dies after bee attack during cricket match in India," 2026. [Online]. Available: https://gulfnews.com/sport/cricket/umpire-dies-after-bee-attack-during-cricket-match-in-india-1.500448568

[7] M. Muzaffar, "Indian cricket umpire dies after bees swarm local match," *The Independent* (via AOL, source: PTI), 2026. [Online]. Available: https://www.aol.com/articles/indian-cricket-umpire-dies-bees-122717129.html

[8] ETV Bharat, "Bee Attack At Funeral In Rajasthan Injures Over 20; Mourners Flee, Last Rites Completed In PPE Kits," Mar. 27, 2026. [Online]. Available: https://www.etvbharat.com/en/state/bee-attack-at-funeral-in-rajasthan-injures-over-20-mourners-flee-last-rites-completed-in-ppe-kits-enn26032706715

[9] Pune Pulse, "Pune Funeral Turns Chaotic After Bee Attack; Relatives Leave Body and Run for Safety," Aug. 3, 2026. [Online]. Available: https://www.mypunepulse.com/pune-funeral-turns-chaotic-after-bee-attack-relatives-leave-body-and-run-for-safety/

[10] Deccan Herald, "Man killed, four injured in bee attack in Madhya Pradesh's Morena district," Mar. 23, 2024. [Online]. Available: https://www.deccanherald.com/india/madhya-pradesh/man-killed-four-injured-in-bee-attack-in-madhya-pradeshs-morena-district-2949688

[11] Deccan Herald, "Elderly man dies, two injured in bee attack in UP's Ballia." [Online]. Available: https://www.deccanherald.com/india/uttar-pradesh/elderly-man-dies-two-injured-in-bee-attack-in-ups-ballia-3408190

[12] "Colony Defense," in *ScienceDirect Topics* (overview entry, agricultural and biological sciences).

[13] "Chemical Communication in the Honey Bee Society," in *Neurobiology of Chemical Communication*, NCBI Bookshelf.

[14] "The effects of climate change on boreal plant-pollinator interactions are largely neglected by science," *Basic Appl. Ecol.*, 2025. Crossref

[15] K. Eldridge, "Pollinators and Climate Change," Xerces Society for Invertebrate Conservation, fact sheet.

[16] "Climate-induced phenological shift of apple trees has diverse effects on pollinators, herbivores and natural enemies," 2018.

[17] "Warming induces short-term phenological shifts in pollinator-plant interactions that enhance larval development in honey bee," 2024.

[18] "Wild Vanilla and pollinators at risk of spatial mismatch in a changing climate," 2025. Crossref

[19] "Climate change intensifies plant–pollinator mismatch and increases secondary extinction risk for plants in northern latitudes," *Proc. Natl. Acad. Sci. USA*, 2025.

[20] "Global warming and plant–pollinator mismatches," *Emerg. Top. Life Sci.*, vol. 4, no. 1, pp. 77–86, 2020. Crossref

[21] "Climate change has desynchronized insect and vegetation phenologies across Europe," *bioRxiv preprint*, 2023.

[22] "The buzz around biodiversity decline: Detecting pollinator shifts using a systematic review," 2023.

[23] R. C. Sihag, "Nesting behavior and nest site preferences of the giant honey bee (Apis dorsata F.) in the semi-arid environment of north west India," *J. Apic. Res.*, vol. 56, no. 4, pp. 452–466, 2017.

[24] "Socio-ecological surveys of Apis dorsata in the mountains of the Nilgiri Biosphere Reserve, Western Ghats, India," *Front. Bee Sci.*, 2024.

[25] Council on Energy, Environment and Water (CEEW), "How can India Map its Risks of Invisible Extreme Heatwave Disasters?," 2026. [Online]. Available: https://www.ceew.in/publications/mapping-climate-risks-and-impacts-of-extreme-heatwave-disaster-in-indian-districts

[26] "India emerges as the world's hottest spot again; UP is the epicentre," *The Federal*, May 23, 2026.

[27] "Extreme Heatwave in India (2026): State-wise Impact, Causes & Climate Effects," *The Civil India*, May 27, 2026.

[28] "Climatological Understanding of Heat and Cold Wave Patterns over Eastern Uttar Pradesh," *J. Agrometeorol.*, 2026.

[29] Uttar Pradesh Climate Change and Clean Environment (UPCCCE), knowledge resources. [Online]. Available: https://upccce.org/knowledge-resourses

[30] "Apis dorsata," *Wikipedia, The Free Encyclopedia* (taxonomy and distribution summary, cross-checked against [43]).

[31] "Nesting Behaviour of the Giant Honeybees Apis dorsata Occurring in Jhargram, West Bengal, India," *Proc. Zool. Soc.*, Springer Nature, 2016.

[32] T. Itioka, "Six-Year Population Fluctuation of the Giant Honey Bee Apis dorsata (Hymenoptera: Apidae) in a Tropical Lowland Dipterocarp Forest in Sarawak," *Ann. Entomol. Soc. Am.*, 2001.

[33] "Migrating Giant Honey Bees (Apis dorsata) Congregate Annually at Stopover Site in Thailand," *PLOS ONE*, 2012. Crossref

[34] "Surfing the Sweet Wave: Migrating Giant Honey Bees (Hymenoptera: Apidae: Apis dorsata) Display Spatial and Temporal Fidelity to Annual Stopover Site in Thailand," *J. Insect Sci.*, vol. 21, no. 6, 2021.

[35] "The defensive response of the honeybee Apis mellifera," *J. Exp. Biol.*, vol. 219, no. 22, pp. 3505–3512, 2016.

[36] "Honeybee communication during collective defence is shaped by predation," 2021.

[37] "Land-use affects pollinator-specific resource availability and pollinator foraging behaviour," 2023.

[38] "Interactive effects of climate and land use on pollinator diversity differ among taxa and scales," *Sci. Adv.*, 2022. Crossref

[39] "Urban habitat fragmentation and floral resources shape the occurrence of gut parasites in two bumblebee species," 2023.

[40] "Urbanization increases floral specialization of pollinators," 2022. Crossref

[41] "Habitat fragmentation restricts insect pollinators and pollen quality in a threatened Proteaceae species," *ScienceDirect*, 2020.

[42] "Habitat preference influences response to changing agricultural landscapes in two long-horned bees," preprint.

[43] "High variability in the attractiveness of municipally-planted decorative plants to pollinators," *bioRxiv preprint*, 2024.

[44] "Enhancing pollination ecosystem service in urban green areas: An opportunity for the conservation of pollinators," *ScienceDirect*, 2022. Crossref

[45] Deccan Herald, "Man killed, 4 others injured in bee attack in Madhya Pradesh's Dhar district," Aug. 13, 2023. [Online]. Available: https://www.deccanherald.com/india/madhya-pradesh/mp-bees-attack-2646050

[46] "South Texas farmer in field dies in bee attack near his tractor; insects in pipe," *Fox News* (local/AP reporting). [Online]. Available: https://www.foxnews.com/us/south-texas-farmer-in-field-dies-in-bee-attack-near-his-tractor-insects-in-pipe

[47] Deccan Herald, "40 injured [in] bee attack [during Bakrid prayers, Saraguru, Karnataka]," Oct. 27, 2012. [Online]. Available: https://www.deccanherald.com/india/karnataka/40-injured-bee-attack-2369651

[48] U.S. Centers for Disease Control and Prevention, "A National ONE HEALTH Framework to Address Zoonotic Diseases," CS 361630-A, 2025.

[49] World Organisation for Animal Health (WOAH), "One Health." [Online]. Available: https://www.woah.org/en/what-we-do/global-initiatives/one-health/

[50] Geneva Environment Network, "One Health and the Role of Geneva." [Online]. Available: https://www.genevaenvironmentnetwork.org/resources/updates/one-health/

[51] "The Interconnected Health Initiative: A Smithsonian Framework to Extend One Health Research and Education," 2021.

[52] "Mapping socioecological interconnections in One Health across human, animal and environmental health: a scoping review protocol," *medRxiv preprint / published scoping review protocol*, 2025.

[53] "Optimizing Health Across Humans, Animals, Plants, and Ecosystems: How Long Before Benefits Turn Harmful—and Harm Becomes Healing?," 2025.

[54] "Bee stings envenomation: a case report," *Int. J. Res. Med. Sci.*, 2022. Crossref

[55] "A Case of Massive Envenomation with Bee Sting: A Case Report," *J. Postgrad. Med. Educ. Res. (JPMER)*.

[56] "Unusual case of recurrent hypoglycaemia in multiple bee sting envenomation," 2021.

[57] "Bee sting envenomation severe cases in Manaus, Brazilian Amazon: clinical characteristics and immune markers of case reports," 2020.

[58] A. Varman, V. Bannur, N. Devi S, and D. K, "Bee Sting: Autopsy of an Anaphylactic Death—A Case Report," 2025.

[59] India TV News, "Tragedy in Unnao: Umpire Manik Gupta dies following massive bee attack during Under-13 cricket match," Feb. 19, 2026. [Online]. Available: https://www.indiatvnews.com/sports/cricket/tragedy-in-unnao-umpire-manik-gupta-dies-following-massive-bee-attack-during-under-13-cricket-match-2026-02-19-1030947

[60] Deccan Herald, "Bee attack hits functioning of Thiruvananthapuram collectorate for second day." [Online]. Available: https://www.deccanherald.com/india/kerala/bee-attack-hits-functioning-of-thiruvananthapuram-collectorate-for-second-day-3453463

[61] GBIF Secretariat, "GBIF API Reference," Technical Documentation. [Online]. Available: https://techdocs.gbif.org/en/openapi/

[62] India Biodiversity Portal, "India Biodiversity Portal publication grade dataset," occurrence dataset accessed via GBIF.org. [Online]. Available: https://www.gbif.org/dataset/c6b86c40-ff71-4e5e-902c-111f400d0d56