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Free-ranging dogs in the streets:

foreseeing a multispecies coexistence crisis beyond shortsighted kindness or conflicts

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Abstract

Nature-based solutions tout climate goals, often ignoring the lived entanglements of multispecies coexistence. Tropical cities have become battlegrounds of misguided kindness and escalating conflicts with animals. Human niche expansion creates a paradox for free-ranging denizens: abundant food sources from waste, yet unprecedented ecological pressures from infrastructural neglect. Using dogs' case, I reveal how ritual feeding and emotional responses create ecological traps—hurting both animals and people—warranting ecological foresight-driven planning for inclusive, more-than-human cities.

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Nature-based solutions (NbS)[1] in urban planning often emphasise climate mitigation goals such as carbon sequestration, while overlooking long-standing, culturally embedded traditions of multispecies coexistence shaped by human-centric ecological niches[2]. In tropical ecosystems, particularly before the rise of modern infrastructure norms, cities were ecologically and culturally co-constructed by humans and a suite of opportunistic species. Conspicuous urban fauna such as dogs, monkeys, and birds — sometimes even wildlife — have long operated within behavioural regimes shaped by human beliefs and practices. These species often perform critical ecological functions, including the safe disposal of organic waste, yet their roles are largely invisible in current NbS frameworks[1]. While urban expansion offers abundant foraging opportunities via refuse, it simultaneously induces profound environmental change, restructuring interspecies interactions and exerting novel selection pressures[3]. This perspective locates an inflexion point in the adaptive responses of nonhuman animals to the human niche, especially pertinent in a world where over 65% of people live in urban areas that occupy less than 4% of Earth's surface[4,5]. Using the case of free-ranging dogs — humanity's oldest nonhuman companion[6] — I argue for the urgent incorporation of multispecies justice into NbS design, to preempt a deepening coexistence crisis at the intersection of kindness, conflict, and ecological oversight.

The Chaos of Coexistence: Humans and Street Dogs

A recent YouTube video[7] depicted an incident in Delhi where a woman utilised an app-based motorbike service for a distance of only 180 meters. The rationale for this unusually short journey was her apprehension towards stray dogs in the locality. While the initial reaction to such a scenario might be amusement, it underscores a more pervasive urban problem[8,9]. Scholars examining human-animal interactions recognise this incident as indicative of a longstanding coexistence challenge[10–13]. Dogs are one example of this broader issue, and a complex dynamic of affection and aversion[2,9] is characteristic[7]. Individuals who care for urban fauna, including dogs, monkeys, kites, and pigeons, frequently neglect to consider the protracted ramifications of their actions, particularly concerning aspects of human-nonhuman coexistence in broader temporal and spatial dimensions[2]. There is a tendency to disregard the inherent consciousness and sentience of animals inhabiting urban environments[14], such as stray dogs. Consequently, population-level processes are significantly impacted by both interspecies and intraspecies interactions[15,16]. These networks of interactions manifest far-reaching consequences that extend beyond what meets our eyes in streets[3,17].

The understanding of dogs (*Canis lupus familiaris*) is particularly trapped in a peculiar paradox. While we have meticulously dissected breed genetics[6,18] to explain specific traits in labradors or pugs, we know surprisingly little about the approximately 800 million free-ranging dogs (FRDs)[8] roaming in tropical landscapes like India. These dogs are not merely "strays" but represent the world's most abundant carnivores, straddling a blurred line between wild and domesticated. Their lives exist in a constant flux of human dependence and autonomy, simultaneously making them ecological and social keystones and public health hazards[19].

Canine street populations — dogs, jackals, and occasionally wolves and foxes — are integral to the daily regional life of India. They are ubiquitous, resting on pavements, moving through commercial areas, and investigating refuse around trash heaps. To some, they are a familiar aspect of the urban environment; to others, they present a daily inconvenience or hazard. The human-canine dynamic in these contexts is a complex mixture of compassion, cultural practices, and discord[19–22]. Though many generously provide them food out of compassion or religious obligation, and people frequently interact with them, many others

endure hardships like the woman in the widely circulated video, leading them to take extreme measures to avoid or reject them completely. It is a paradox we have never quite sorted out. Urban infrastructure forces dogs to utilise roads as both territories and conduits (Fig. 1), a consequence of the provisioning via waste or ritual offerings, necessitating a mutual behavioural adjustment[23] between humans and canines. Consequently, dogs tend to respond to feeding by exhibiting behaviours perceived by humans as vigilant street sentinels. The latter causes conflicts. Despite millennia of coexistence with these commensal/companion animals[6,24], fundamental aspects of interaction remain unaddressed. Contrary to assertions by certain experts, popularly called dog behaviourists, apprehension regarding street dogs is not unwarranted—it signifies a system that has become dysfunctional, caught between impulsive actions and an urgent requirement for strategic resolutions: regardless of whether one opts to feed a dog as an act of kindness, or throw objects to deter canines that pose a risk.

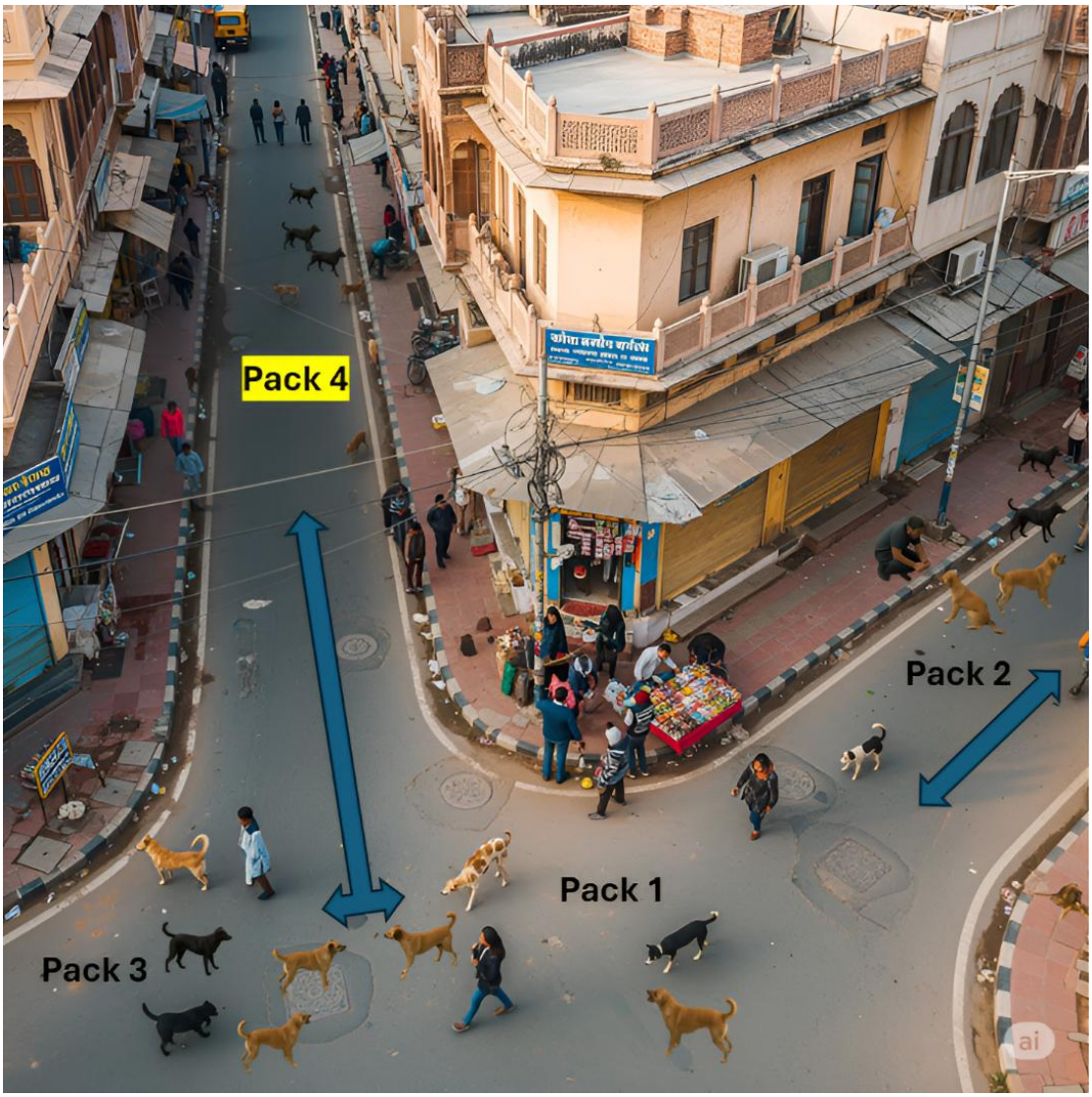

Fig. 1. Urban infrastructure as a behavioural scaffold: structuring canine degrees of freedom and inter-pack dynamics. This image depicts a busy street intersection in an Indian city, where multiple free-ranging dog packs coexist in proximity to humans, commercial stalls, and traffic corridors. The presence of Packs 1, 2, 3, and 4 in distinct spatial zones illustrates how infrastructure shapes the degrees of behavioural interaction among canine groups. While Packs 2 and 4 are aligned along single road segments and exhibit limited bidirectional interaction, Pack 1 and 3—situated at the crossroad—is positioned at a convergence zone, increasing its degrees of freedom for inter-pack and human interaction. This spatial ecology is not incidental but symptomatic of a larger phenomenon: urban infrastructure predisposes the behavioural interface between dogs, other commensals and humans, forming both conduits and barriers. While some humans view these animals as benign or sacred beings worthy of feeding, others perceive them as threats to safety and mobility. This contradiction underpins a multispecies paradox. Provisioning behaviours—whether through ritual feeding or waste discard—induce dogs to respond with heightened alertness and site fidelity, creating "sentinel" effects that may be misinterpreted as territorial aggression. The figure encapsulates this urban entanglement by illustrating how infrastructure implicitly structures canine socioecology. Roads, footpaths, and built edges serve not only as transit routes but also as interaction platforms that amplify or restrict pack dynamics. These spatial constraints influence mating, aggression, alliance formation, and feeding hierarchies, which remain poorly understood in existing urban animal management frameworks. Image generated using Gemini AI.

The Feeding Trap: Kindness With a Catch

Providing food, such as biscuits, milk, chapati or rice, to stray dogs in India is commonplace. This action is often motivated by compassion and is sometimes associated with spiritual beliefs regarding *karma* or *dharma* that may as well be an informal practice of cross-species reciprocity and cooperation[25,26]. However, this seemingly kind gesture can have unintended negative consequences. Indiscriminate feeding of urban dogs contributes to a population increase. In cities such as Delhi, where waste management is already a significant challenge and overflowing bins provide a constant food source for strays, human handouts exacerbate the problem, leading to an overpopulation of dogs in urban areas[27]. This increased dog population in densely populated spaces results in more frequent interactions between humans and dogs[2], which may lead to negative incidents such as bites, barking, and general public unease[28,29]. Consequently, individuals may resort to drastic measures, including running away, harming the dogs, or relying on motorised transportation to avoid encounters; similar conflicts arise with other opportunists[2].

These short-sighted actions of generosity constitute a significant element of the problem. Individuals who feed dogs and other fauna experience immediate satisfaction[2], yet such gratification frequently neglects the adverse repercussions of this misguided empathy[23]. These repercussions manifest as amplified distress when the aforementioned animals must navigate urban environments and interact with the human populace, particularly when these creatures are mobile in pursuit of maintaining their social structures[30,31]. As parties accountable for feeding urban animals, we often fail to comprehend the larger spatial and temporal ramifications. Specifically, we neglect the effects of feeding upon the breeding habitats[15] and strategies of these dogs and other animals[32], which elements of the habitat will serve as refuge, and the consequences of population boom in municipal terms[33]. This predicament is viciously cyclical and resistant to anti-birth control-based resolution due to its origins in human sentiment. Nonetheless, the pursuit of sustainable coexistence necessitates a departure from solely addressing the immediate nutritional needs of animals. Such a perspective represents an excessively anthropocentric expression of empathy[2,3].

A comparison between tiger conservation[34] and the current (variegated) state of dog welfare is illuminating. Tiger welfare is underpinned by scientific research, which delineates their requirements for territory, prey availability, protected corridors, and engagement with local communities. Conservation policies, though not without their flaws[35,36], reflect this scientific understanding[34]. However, in the case of dogs, which exert considerable ecological influence[37–40] and are deeply embedded in human society, a contrasting scenario prevails. There are no designated corridors or "sanctuaries" for canines. Their ecological niches encompass urban environments, refuse disposal sites, and the complex realm of human-animal interactions. A significant lacuna exists in the comprehensive understanding of dog social structures, behavioural patterns, and population dynamics within urban India.

In heterogeneously developed urban settings characterised by disorder[2,3], dog populations establish social groups of varying dimensions[27]. In locales such as Delhi, extended pack structures consisting of males, females, and offspring thrive within areas encompassing refuse disposal sites and major roadways[3]. Their existence transcends mere foraging; it involves the maintenance of social dynamics, the protection of territorial boundaries, and the rearing of progeny[27]. Instances of allopaternal guardianship of pups[9], even amidst food abundance, indicate the presence of novel behaviours. Nonetheless, there is a dearth of scholarly inquiry into the mechanisms by which these animals navigate their social ties with both humans and conspecifics. Fundamental questions remain unanswered: What constitutes a perceived threat? What

factors underlie their expressions of aggression, loyalty, and decisions regarding residency or departure? Current understanding in these domains remains limited.

The Numbers Don't Lie: A Crisis in Plain Sight

The human-dog coexistence stakes here are not small; the implications are substantial. India experiences over 20 million incidents of dog bites annually, representing a significant increase over recent decades. Furthermore, rabies, a critical health concern, results in 20,000 deaths per year in India, constituting 36% of global rabies-related fatalities[20]. These figures underscore a severe public health crisis, rather than mere inconvenience[41].

However, the issue extends beyond bites and rabies. Free-ranging dogs significantly impact the ecosystem. With an estimated Indian population of 80 to 100 million, which is the largest globally[20,42], they exert considerable ecological pressure. Predation upon endangered species, such as the Great Indian Bustard[43], of which fewer than 150 remain, poses a grave threat. Furthermore, they are vectors for diseases like canine distemper, which recently resulted in a 30% reduction of the Gir lion population[44]. These interconnected consequences are in the nascent stages of comprehension, revealing a multifaceted issue that extends beyond anthropocentric concerns, encompassing a network of ecological ramifications necessitating further scholarly inquiry. Notably, free-ranging dog populations engage in collective predation, impacting prey dynamics[34] and inducing interference competition on predators and scavengers[3].

Dogs as Neighbours: What We Don't Know Hurts Us

Situations of shared living spaces present significant complexities. Dogs are not merely stray animals; they are social beings exercising innate and learned behaviours in response to the human niche for millennia[45,46]. They have discerned that human presence equals food, regardless of whether it is discarded remnants or refuse heaps. However, this observation raises several questions. Does the act of human feeding induce increased territoriality among the dogs toward specific human individuals? Does it contribute to heightened boldness or aggression? How do they reconcile their established pack hierarchy with the provision of food by humans?[47,48] These are matters where our folk conjectures[3] outweigh concrete knowledge, which poses a considerable issue.

Robert L. Trivers' theory of parent-offspring conflict[49] from a cross-species standpoint is pertinent to conspecific and interspecific interactions at the human-dog interface. In Delhi, malnourished female dogs rear large litters[27], which get variable support from people. As a consequence, pups receive foster support but are deceased early due to malnutrition or accidents, which exemplifies a critical struggle for survival, likely permeating various behavioural strategies. Notably, there is a dearth of data connecting adverse physiological states to behavioural problems in free-ranging dogs. Their analysis shall explore the behavioural constraints encountered by commensal animals in urban settings, specifically focusing on how lactating females navigate the inherent conflict[32] between defending their offspring and accepting food from humans, who may pose a perceived threat. Such modulation is especially relevant for large vertebrates armed with potentially dangerous weaponry (teeth, claws, talons, etc.) and thus theoretically capable of injuring people, driving them away[23,32]. A deleterious cycle exists: suffering often engenders further suffering. It impacts dogs that receive care, people whose compassionate yet ultimately myopic actions involve feeding and ostensibly "caring" for them, and other dogs and people. Such provisioning, while intended to foster a sense of protection and association, often results in deleterious consequences, including harm and aggression towards other members of the urban populace[29].

This calls for a more **farsighted** approach, one that acknowledges the unforeseen ramifications of ritual feeding[2]. Actions perceived as acts of charity—habitually feeding stray dogs—frequently obscure a critical disregard for the security and well-being of other people and animals. This engenders an "illusion of kindness," a deceptive semblance. By normalising the presence of dogs in perilous street environments, we inadvertently subject them to lethal perils, including vehicular trauma, pathogenic exposure[2], and territorial conflicts[27]. Their adaptive survival mechanisms, whereby they learn to correlate human proximity with food and protection, may also elicit offensive behaviours towards the unfamiliar, founded in instinct. Prolonged exposure to hostile environments fundamentally modifies dog ethology, escalating the probability of aggressive interactions with both human and non-human subjects[23].

Considering the analogy of sight, the myopia of coexistence with dogs is offering only food to random dogs, without implementing the overall ambit of care in association with sterilisation[21,22]. It entails conflating anthropomorphic sentimentality with genuine welfare, the erroneous assumption that compassion toward individual dogs through platform feeding ensures both their welfare and public safety. Prescience, conversely, necessitates a reconceptualisation of the human-dog relationship through the lens of population dynamics[16], resource management, disease vectors[2], and interspecies ethical[3] considerations. It demands perceiving dogs not merely as hapless street companions or resilient strays but as populations with eco-evolutionary adaptations. Concurrently, there exists an impetus to remove street dogs from public thoroughfares via relocation, often euphemistically referred to as "purging", for which the Honourable High Court of Delhi has issued a directive[50]. Contrarily, communities ardently defend "their" dogs against municipal sterilisation units[27]. Although intended as a venerated solution settled by the Honourable Delhi High Court, designated feeding areas contradict the fundamental ecological principle of territoriality and frequently exacerbate, rather than resolve, the underlying issue. This order was ultimately stayed by the Honourable Supreme Court[51]. Streets in cities like Delhi witness dog pups crushed by vehicles, while residents keep feeding urban commensals. We are witnessing two parallel realities: visible acts of kindness masking invisible cycles of suffering (*author's unpublished data*).

Traditionally effective perspectives on human-animal interaction have been challenged by the current scale of urban food subsidies dispersed along variable infrastructure[15]. Delhi's per capita income — now the highest in the country[52] — has resulted in increased ritualistic feeding of dogs and other animals, which significantly alters canine behaviour toward unfamiliar people. Current research is insufficient to fully understand these impacts, and the complexities of human-animal conflict, beyond bite incidents, remain poorly documented[29,40]. We urgently need to examine the complex interactions between individual urban dogs and their overall population dynamics under anthropogenic influences to mitigate the escalating issues surrounding dog-related conflicts. The lack of comprehensive understanding obstructs efficacious management strategies, resulting in reactionary approaches primarily driven by reported bite incidents and public apprehension. Notably, the perception of conflict among urban residents is contingent upon their frequency of exposure to unfamiliar dogs. Furthermore, individuals from socioeconomically disadvantaged backgrounds engaged in door-to-door services, who frequently utilise bicycles or similar modes of transportation, are disproportionately vulnerable to dog aggression[27].

A Way Forward: From Survival to Coexistence

In many ways, our well-intentioned patronising human nature towards select free-ranging species is compromising both public health and animal welfare, creating an ecological trap[53–55] for both agencies. Consequently, further investigation is imperative to elucidate the fundamental effects of environmental and regional infrastructural elements on the human-dog relationship, thereby facilitating the development of coexistence strategies. The individual featured in the widely disseminated video[7] represents how the general populace encounters such challenges, with billions facing comparable circumstances daily. Remedial efforts predicated on transient resolutions are insufficient; it is exigent to formulate long-term solutions that address the causative factors, not mere temporary relocation. This is not a call to vilify dogs, but rather a call to acknowledge the complexities of the situation. It is essential to recognise that urban free-ranging dogs are neither domestic animals that have failed to find homes, nor embodiments of idealised fidelity, nor merely warranting elimination. They are sentient beings, possessing cognitive abilities and adaptive mechanisms, whose destinies are inextricably intertwined with those of humans. Urban environments exert a profound influence on their evolutionary trajectory and behavioural patterns, which, in turn, significantly affect human policies, apprehensions, empathic responses, and cognitive biases/perceptions[3].

Addressing the challenge of stray dog populations necessitates a multi-faceted approach. Firstly, effective waste management[56] is paramount. Reducing readily available food sources by increasing bin availability, implementing regular waste collection, and minimising littering can disrupt the supply chain supporting stray dogs. Secondly, strategic feeding initiatives are crucial. Instead of haphazard distribution of food, redirecting public generosity towards established shelters along with organised feeding programs can help control population growth via anti-birth control measures. Third, public education is essential. Raising awareness about the risks associated with stray dogs, such as rabies and ecological disruption, and promoting safe coexistence through workshops, public campaigns, and educational programs[3], particularly for children, the elderly and the vulnerable, is vital[57]. Lastly, rigorous research into dog behaviour and population dynamics is required to inform evidence-based strategies and evaluate their efficacy.

It is imperative to conduct research that transcends mere sterilisation statistics and vaccination tallies. Longitudinal studies[3,34] are required to monitor behavioural patterns, assess population fluctuations, and comprehend interspecific interactions. Urban development and planning should incorporate the spatial utilisation patterns of dogs and other commensals, including the creation of habitat systems where people can continue feeding, while also participating in overall care to limit agonistic encounters. Public educational initiatives must extend beyond the cultivation of compassion, focusing instead on the formulation of coexistence paradigms predicated upon ecological as well as cultural principles. The era of reactive emotional interventions has concluded. Scientific inquiry, empathetic consideration, and strategic planning with a forward-looking perspective are now essential.

This discourse does not advocate for the expulsion of dogs from urban environments. Rather, it promotes the recognition of these animals as sentient beings with intrinsic requirements and natural behaviours, transcending the simplistic perception of them as mere issues requiring resolution, or animals that only need to be fed. Coexistence necessitates a dynamic equilibrium; it is a moving target against the backdrop of urban changes that yields conviviality, not conflict. Given the dynamic nature of ecosystems that are reeling under anthropogenic pressures, such coexistence with non-humans cannot be the status quo. Individual decisions that highlight systemic deficiencies concerning both human and nonhuman shall be monitored to govern well-being. Ultimately, the central inquiry is straightforward: Are we prepared to adopt

a comprehensive perspective? Or will we persist in our current course of action, characterised by partial comprehension and the misguided assumption of assisting, while concurrently engendering suffering in dogs and humans alike, and contributing to the escalation of urban hazards?

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