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EDITORIAL

Declining Population of the Giant Honeybee, *Apis dorsata*: Emerging evidence and Conservation Imperatives

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INTRODUCTION

The giant honeybee, *Apis dorsata*, is among the most ecologically significant pollinators of South and Southeast Asia (Abrol, 2023; Sihag, 2025). It constructs large, single-comb nests in exposed environments, often forming a protective curtain of worker bees (Oldroyd and Wongsiri, 2006). These nests are typically suspended from tall trees, cliffs, and occasionally human-made structures such as roofs and water tanks, distinguishing the species from cavity-nesting bees such as *A. mellifera* and *A. cerana* (Woyke *et al*., 2012).

Over the years, substantial progress has been made in understanding the biology, ecology, and behavior of *A. dorsata*. Yet much remains to be learned about its population status, trends, and the potential consequences of its decline. Despite its adaptability and wide distribution, emerging evidence suggests localized declines and reduced colony occupancy of *A. dorsata* populations in several regions (Cao *et al*., 2023; Sihag, 2025). These trends are concerning, although long-term population assessments across its range remain limited.

This paper argues that a clearer picture of population trends across the full range of *A. dorsata* is needed to identify the drivers of decline, assess the consequences for ecosystems and agriculture, and design targeted conservation strategies. Given the species' indispensable role as a pollinator of both wild flora and cultivated crops, safeguarding *A. dorsata* populations is inseparable from broader goals of biodiversity conservation, sustainable agriculture, and the long-term security of pollination services upon which both ecosystems and human livelihoods depend.

ECOLOGICAL NICHE AND SPECIES DIFFERENTIATION

Apis dorsata is often compared with its close relative, *A. laboriosa*, another large, open-nesting species. However, their ecological niches are clearly differentiated. *A. laboriosa* inhabits high-altitude Himalayan regions, foraging at elevations of up to 4,200 meters above sea level, and migrates to lower elevations during winter, sometimes as low as 800 meters. In contrast, *A. dorsata* dominates the subtropical belt and may occupy similar lower elevations during warmer months.

The two species are rarely observed coexisting in the same landscape at the same time of year (Cao *et al*., 2023), suggesting a finely tuned ecological partitioning shaped by altitude, climate, and floral availability (Ahmad *et al*., 2003). This differentiation highlights the ecological specialization of *A. dorsata* within subtropical ecosystems (Hepburn and Radloff, 2011).

GLOBAL CONCERNS OF POLLINATOR DECLINE

Concerns about pollinator decline are well documented globally. The Inter-governmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2016) assessment highlights widespread reductions in pollinator abundance, diversity, and distribution. Wild and native honeybees are particularly vulnerable to climate change and environmental variability. Rising temperatures, erratic rainfall, prolonged droughts, floods, forest fires, and landslides are disrupting habitats and weakening the synchrony between bees and flowering plants. Seasonal cycles that historically aligned swarming, brood rearing, and migration with floral phenology are becoming increasingly unpredictable. Changes in nectar secretion, pollen availability, and honeydew flows are undermining colony nutrition and resilience. These stresses are compounded by emerging pests and pathogens, habitat degradation, and environmental pollution. Anthropogenic pressures, including land-use change, pesticide misuse, monoculture farming, and deforestation, further intensify these isks.

ECOLOGICAL AND ECONOMIC MPORTANCE OF *Apis dorsata*

The economic implications of pollinator decline are substantial. The IPBES (2016) assessment estimates that 5–8% of global crop production value, which is equivalent to **US$235–577 billion annually**, **depends on animal pollination**. Among, animal pollinators, honeybees (genus *Apis*) are key contributors to the natural functions of ecosystems, and they are also the most economically valuable pollinators within natural and agricultural systems (Hung *et al*., 2018). Wild pollinators, including *A. dorsata*, often contribute more to crop yield stability and quality than managed bees. In semi-arid regions of India, *A. dorsata* has been documented as a dependable pollinator for more than 30 crop species (Sihag, 2025). Its large colony size and effective pollen-carrying capacity make it particularly efficient. Unlike managed honeybees (*A. mellifera*) that frequently concentrate on cultivated crops, *A. dorsata* relies heavily on

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Wild flora, thereby supporting both agricultural production and ecosystem integrity (Joshi and Pechhacker, 2000). Its honey, harvested from natural colonies, is widely perceived as “organic by default,” reflecting minimal human intervention.

Attempts to harness its honey production potential have included non-destructive method of cutting honey portion of comb, rafter beekeeping and the installation of artificial nesting supports in areas where natural nesting sites have declined (Joshi and Gurung, 2005; Guerin, 2019; Sihag, 2025). While such approaches demonstrate innovation, they remain limited and require further validation under diverse ecological conditions.

EVIDENCE AND DRIVERS OF DECLINE

Multiple lines of evidence point to a significant decline in *A. dorsata* populations (Sihag, 2025). In northern India, colonies of both *A. dorsata* and *A. laboriosa* have been reported to be drastically declined during the last 30 years, primarily due to decline of floral resources, attack of pests and diseases, environmental degradation, and destructive honey harvesting practices (Abrol, 2023). A similar trend has been reported for *A. dorsata* in Tamil Nadu (Rehl *et al*., 2024). Cao *et al*. (2023) have reported recent declines in their population in China and neighbouring regions. Key contributing factors include deforestation and sharp reduction in nesting sites (Sihag, 2014; Oldroyd and Nanork, 2009). Increasing forest fires linked to prolonged dry seasons and rising temperatures, and the widespread destruction of nesting habitat is an emerging threat in Nepal. Concern about the future availability of *A. dorsata* honey have been raised with report on declining honey bee populations in Indonesia as well (Schouten, *et al*, 2019).

Climate variability is altering flowering phenology, disrupting plant–pollinator interactions. Emerging diseases and parasites, some associated with managed bee populations, pose additional threats (Oldroyd and Wongsiri, 2006; Chantawannakul *et al*., 2016). Anecdotal evidence and field observations suggest declining colony aggregations and fewer active nesting sites. For instance, observations from Rampur, Chitwan, reported 96 comb nests on a water tower in 2014, compared to only seven nests recorded a decade later. Earlier studies (Pokhrel, 2010) attributed such declines to environmental degradation, pesticide exposure, reduction in bee forage crops such as mustard, and the proliferation of *A. mellifera*. Parasitic mites such as *Tropilaelaps clareae* have also been documented to increasingly infest *A. dorsata* colonies, with infestation rates rising as colonies age (Shrestha, 2001). Furthermore, colony occupancy has been shown to correlate strongly with climatic variables such as temperature, humidity, and precipitation (Devkota *et al*., 2022).

The decline *A. dorsata* is driven by multiple and interacting factors, including but not limited to the following:

A. Habitat Loss and Degradation: Deforestation, land-use change, and infrastructure development reduce nesting sites and forage availability.

B. Climate Change and Variability: Changes in temperature and precipitation disrupt flowering patterns and colony dynamics.

C. Unsustainable Harvesting Practices: Destructive honey harvesting damages brood and reduces colony survival.

D. Pesticides and Agricultural Intensification: Chemical exposure weakens colonies and affects bee health.

E. Pests, Pathogens, and Invasive Species: Parasites and invasive flora reduce colony fitness and forage diversity.

These drivers do not act in isolation; rather, they interact in complex and reinforcing ways, amplifying their overall impact on bee populations (Potts *et al*., 2010).

ECOLOGICAL CONSEQUENCE AND CONSERVATION IMPERATIVES

The decline of *Apis dorsata* is not merely a species-specific concern; it signals a broader erosion of ecological resilience in subtropical ecosystems. As a keystone pollinator, its reduction can cascade through plant communities, affecting biodiversity, forest regeneration, and food security.

Addressing the decline of *A. dorsata* requires coordinated, multi-scale interventions:

- Habitat protection and restoration of nesting trees, aggregations sites and forage resources
- Promotion of non-destructive and sustainable honey harvesting practices
- Reduction and regulation of pesticide use
- Integration of pollinator conservation into agricultural and forest policies
- Community engagement and use of local ecological knowledge

Long-term monitoring and research on population dynamics, migration, and disease ecology

Such integrated approaches are essential to enhance resilience of both pollinator populations and ecosystems

Safeguarding the giant honeybee ultimately means safeguarding the ecological integrity of the subtropical ecosystem. Its survival is inseparable from the health of the landscapes it inhabits, and landscapes that sustain both biodiversity and human livelihoods.

REFERENCES

Abrol, D.P. (2023) Decline in Population of Giant Honeybees. In D.P. Abrol (Ed.) *Role of Giant Honey Bees in Natural and Agricultural Systems*; p. 330. CRC Press: Boca Raton, FL, USA.

Ahmad, F.; Joshi, S. R.; Gurung, M. B. (2003). The Himalayan cliff bee Apis laboriosa and the honey hunters of Kaski. ICIMOD, Kathmandu, Nepal

Cao, L., Dai, Z., Tan, H., Zheng, H., Wang, Y., Chen, J., Kuang, H., Chong, R.A., Han, M., Hu, F., Sun, W., Sun, C., & Zhang, Z. (2023). Population structure, demographic history, and adaptation of giant honeybees in China revealed by population genomic data. *Genome Biology and Evolution, 15*(3). https://doi.org/10.1093/gbe/evad025

Chantawannakul, P., Williams, G. R., & Neumann, P. (2016). *Asian Beekeeping in the 21st Century*. Springer. https://doi.org/10.1007/978-981-10-8222-1

Devkota, K.; Fernando dos Santos, C.; Raguse-Quadros, M.; Blochtein, B (2022).

Influence of seasonal weather variables and habitat type on numbers of colonies of the giant honey bee in Nepal. Apidologie 53:5. https://doi.org/10.1007/s13592-022-00912-x

Guerin, E. (2019). Rafter Beekeeping: Sustainable Management with *Apis dorsata* Training Manual. WWF, Thailand. https://www.amazon.com/Rafter-Beekeeping-Eric-Guerin/dp/1913811018

Hepburn, H. R., & Radloff, S. E. (2011). *Honeybees of Asia*. Berlin, Springer-Verlag.

IPBES (2016). *The Assessment Report on Pollinators, Pollination and Food Production*. https://doi.org/10.5281/zenodo.3402856

Hung, KLJ; Kingston, J M; Albrecht, M; Holway, DA; Kohn, J R (2018). The worldwide importance of honey bees as pollinators in natural habitats. Proc. R. Soc. B Biol. Sci., 285 (2018), p. 20172140, 10.1098/rspb.2017.214

IPBES (2016). *The Assessment Report on Pollinators, Pollination and Food Production*. https://doi.org/10.5281/zenodo.3402856

Joshi, S.R. and Gurung, M.B. (2005) Non-destructive Method of Honey Hunting. Bee World 63. IBRA. https://lib.icimod.org/records/wxpaz-bcv60/files/816.pdf?download=1

Joshi, S.R. & Pechhacker H (2000). Pollen Analysis of Honey from Different Bee Species in Chitwan. Mellifera – Journal of Beekeeping (1):1 (51-56).

Oldroyd, BP; Nanork P (2009). Conservation of Asian honey bees. *Apidologie (40)* 296-312

Oldroyd, B. P.; Wongsiri, S. (2006). *Asian Honey Bees*. Harvard University Press.

Pokhrel, S. Climato-cyclic immigrations with declining populations of wild honeybee, *Apis dorsata* F. in Chitwan valley, Nepal. *J. Agric. Environ.* **2010**, *11*, 51–58

Potts, S. G., *et al*. (2010). Global pollinator declines: trends, impacts and drivers. *Trends in Ecology & Evolution*, 25(6), 345–353. https://doi.org/10.1016/j.tree.2010.01.007

Rehl, SM; Basavegowda, M; Thankiyan, J; Roy, P (2024) Socio-ecological surveys of *Apis dorsata* in the mountains of the Nilgiri Biosphere Reserve, Western Ghats, India. Front. Bee Sci., 12 December 2024. Sec. Bee Physiology. Volume 2 - 2024 | https://doi.org/10.3389/frbee.2024.1385640

Schouten, C; Lloyd, D; Ansharyani, I; Salminah, M; Somerville, D; Stimpson, K (2019). The role of honey hunting in supporting subsistence livelihoods in Sumbawa, Indonesia. Geographical Research 58(3). DOI:10.1111/1745-5871.12380

Shrestha, J B. (2001). Infestation of *Tropilaelaps clareae* in *Apis dorsata*. MSc Thesis submitted to Institute of Agriculture and Animal Sciences, Tribhuvan University, Nepal.

Sihag, R.C. Phenology of migration and decline in colony numbers, and crop hosts of giant honey bee (*Apis dorsata* F.) in semiarid environment of Northwest India. *J. Insects* **2014**, *2014*, 639467. https://doi.org/10.1155/2014/639467

Sihag, R C (2025). Conservation of Giant Honey Bee (*Apis dorsata* F.) for Honey and Beeswax Production and Sustainable Pollination Services. *Insects* 2025, *16*(6), 560; https://doi.org/10.3390/insects16060560

Woyke, J.; Wilde, J.; Wilde, M. Swarming and migration of *Apis dorsata* and *Apis laboriosa* honey bees in India, Nepal and Bhutan. *J. Apic. Sci.* **2012**, *56*, 81–91. http://www.jas.org.pl