

BIOLOGY, ECOLOGY AND CONSERVATION OF THE ASIATIC WILD BUFFALO (*BUBALUS ARNEE*): CURRENT STATUS, THREATS AND FUTURE PERSPECTIVES

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Received March 15, 2026 and accepted May 20, 2026

ABSTRACT: The Asiatic wild buffalo (*Bubalus arnee*) is one of the largest wild bovids and an important megaherbivore of South and Southeast Asia. The species is classified as Endangered and has undergone a severe reduction in its historical range because of habitat loss, hunting, livestock competition, disease transmission, genetic introgression and population fragmentation. Most of the remaining global population occurs in India, particularly in northeastern and central India, while small and geographically restricted populations persist in Nepal and parts of mainland Southeast Asia. Wild buffaloes are strongly associated with grasslands, wetlands, marshes and floodplains and can influence vegetation structure, nutrient cycling and habitat heterogeneity through grazing, movement and wallowing. Conservation is complicated not simply by low population size but also by population isolation, livestock-associated disease risks and hybridization with domestic buffalo (*Bubalus bubalis*). Effective conservation therefore requires an integrated strategy combining habitat protection, genetic assessment, disease management, population monitoring and carefully planned translocation. Recent research has demonstrated the feasibility of restoring wild buffalo populations in suitable parts of their former range, including Kanha Tiger Reserve in central India. In 2026, a major translocation initiative was undertaken to restore wild buffaloes to Kanha through the transfer of individuals from Kaziranga Tiger Reserve, Assam. This initiative represents an important transition from preventing local extinction toward the active restoration of a historically lost population. This review summarizes the taxonomy, distribution, habitat use, feeding ecology, behaviour, reproduction, ecological role, threats and conservation strategies for *B. arnee*, with particular emphasis on India, and identifies priorities for establishing multiple self-sustaining and genetically appropriate populations across suitable parts of the historical range.

Keywords: Asiatic wild buffalo, *Bubalus arnee*, ecology, hybridization, conservation genetics, translocation, reintroduction, megaherbivore

The Asiatic wild buffalo (*Bubalus arnee*), also known wild water buffalo or Indian wild buffalo, is among the largest wild bovids in Asia. It is distinguished by its massive body, dark coloration, broad hooves and exceptionally large horns. The species is currently classified as Endangered, and its surviving populations are highly fragmented. Recent assessments estimate the global population at approximately 4,000 individuals, with about 90% occurring in India (Pacha *et al.*, 2021; Bora *et al.*, 2024). The 2024 assessment identified the northeastern and central Indian populations as particularly important to the species' conservation, while emphasizing the vulnerability of the central Indian population (Bora *et al.*, 2024).

Historically, wild buffaloes occupied extensive floodplains, wetlands, grasslands and riverine habitats throughout South and Southeast Asia. Their distribution has contracted substantially because of hunting, conversion of grasslands and wetlands to agriculture, human settlement, livestock grazing and habitat fragmentation. The species has disappeared from a large

proportion of its former range, leaving populations concentrated in a relatively small number of protected and semi-protected landscapes (Choudhury, 1994; Aryal *et al.*, 2011; Mishra *et al.*, 2021).

The conservation problem is therefore not simply one of increasing population numbers. Several populations are small and isolated, while contact with domestic buffaloes creates the possibility of genetic introgression. At the same time, livestock sharing grazing areas and water sources can increase the risk of pathogen transmission. These interacting pressures mean that population augmentation without genetic and veterinary safeguards may not necessarily produce long-term conservation success.

A modern conservation strategy must therefore address three linked objectives: maintaining genetically appropriate wild populations, protecting and restoring suitable habitat, and reducing demographic and disease-related risks. Translocation and reintroduction can contribute to these objectives when they are based on rigorous ecological assessment, genetic screening, veterinary protocols and long-term post-release

monitoring. This review examines current knowledge of the biology and ecology of *B. arnee*, evaluates the principal threats to its persistence and considers contemporary conservation strategies, with particular emphasis on India and the recent restoration initiatives.

Taxonomy and Distribution

The Asiatic wild buffalo belongs to the family Bovidae, subfamily Bovinae and tribe Bovini. The accepted scientific name is *Bubalus arnee* Kerr, 1792, with *Bos arnee* representing the original combination (Groves and Grubb, 2011; Mammal Diversity Database, 2026). Modern taxonomic treatments recognize *B. arnee* as the Asian Wild Buffalo, although the taxonomic history of wild and domestic buffaloes has been complex.

The relationship between wild and domestic buffaloes is particularly important for conservation because genetic similarity does not necessarily imply that all individuals found within a wild population are genetically equivalent. Molecular studies have demonstrated relationships among wild, river and swamp buffalo lineages and have highlighted the importance of distinguishing genuinely wild animals from domestic or hybrid individuals when selecting conservation founders (Mishra *et al.*, 2015). Mitochondrial genome research has further contributed to the taxonomic assessment of *B. arnee* and provided molecular information from wild buffalo samples from Assam and Chhattisgarh (Pacha *et al.*, 2021).

Historically, *B. arnee* occupied a much larger range across South and Southeast Asia. Its present distribution

HABITAT AND FEEDING ECOLOGY

Wild buffaloes are strongly associated with low lying grasslands, marshes, wetlands, floodplains and areas with permanent or seasonal water. Water availability is particularly important because buffaloes frequently use wet habitats for feeding, thermoregulation and movement. They may also use forest edges and relatively dry terrestrial habitats, particularly in central India, indicating that habitat requirements are broader than a strict dependence on open wetlands (Bora *et al.*, 2024).

The species is predominantly a grazer, although its diet includes grasses, sedges, forbs and other plant materials.

Research in Koshi Tappu Wildlife Reserve, Nepal, documented 54 plant species consumed by wild buffaloes. Graminoids and forbs were used 2-3 times more frequently than browse items, indicating a strong preference for herbaceous vegetation. The study also showed that buffaloes consumed a relatively broad range of forage while maintaining a relatively consistent macronutrient balance in their diet (Shrestha *et al.*, 2020). This dietary flexibility is ecologically significant because it allows buffaloes to exploit changing vegetation conditions across wetlands and grasslands. However, availability of natural forage can decline where livestock

is highly fragmented, with the largest remaining populations occurring in India, while small and geographically restricted populations persist in Nepal, Bhutan, Thailand and Cambodia. The species is also reported from Myanmar, although its current status and population viability there remain poorly documented (Aryal *et al.*, 2011; Bora *et al.*, 2024). Overall, the present range is characterized by small, isolated populations and substantial uncertainty regarding the status of some peripheral populations (Table 1).

In India, the largest remaining concentration occurs in Assam, where important populations are associated with Kaziranga, Manas, Orang and Dibru-Saikhowa National Parks and the Laokhowa-Burachapori landscape. Smaller and highly threatened populations also occur in central India, particularly in Chhattisgarh, where the Udanti-Sitanadi and Indravati landscapes remain important for the conservation of the species (Mishra and Gaur, 2019; Mishra *et al.*, 2021).

The concentration of the species within a relatively small number of landscapes creates an important conservation paradox. Protection of large populations in Assam has prevented global extinction, but geographic concentration simultaneously increases the consequences of localized disease outbreaks, environmental disasters or other large-scale disturbances. Establishing additional viable populations is therefore relevant not only to range restoration but also to reducing the species' vulnerability to geographically concentrated threats.

grazing is intense or where grasslands are converted to agriculture.

Wild buffaloes may also enter agricultural fields and consume crops such as rice and sugarcane. Although crop use can provide additional food resources, it can increase human-wildlife conflict and create opportunities for retaliatory killing or increased livestock contact. Maintaining productive natural forage within protected landscapes and managing buffer areas are therefore important components of conservation (Shrestha *et al.*, 2020).

The Kanha feasibility assessment illustrates the importance of habitat quality rather than habitat area alone. Approximately 390 km² was identified as suitable habitat, but moist grasslands were considered particularly favourable because of their greater productivity, lower grazing pressure and availability of perennial water sources (Bora *et al.*, 2024).

Morphology, Behaviour and Reproduction

The Asiatic wild buffalo is a large, strongly built bovine with a massive torso, muscular limbs and broad hooves adapted to movement through wet and muddy substrates. Adult males are generally larger and more robust than females. The enormous laterally extending horns are the

species' most distinctive external feature and can exceed one metre in length. Broad hooves facilitate movement through marshes and floodplains, while large body size provides substantial protection against predators (Prater, 2005).

Wild buffaloes are social animals and commonly occur in female-dominated groups containing adult females, calves and sub-adults. Males may form smaller bachelor groups, whereas mature bulls may become solitary. Group size varies according to habitat conditions, season and population density. Sociality is likely to provide benefits through collective vigilance and protection of young animals (Prater, 2005; Aryal *et al.*, 2011).

Reproductive information is derived from historical observations and field studies. Gestation lasts approximately 10-11 months and females generally produce a single calf. Relatively long calving intervals mean that populations cannot rapidly compensate for sustained adult mortality. This demographic characteristic has important conservation implications: preventing mortality of breeding adults may be more effective for population recovery than relying solely on subsequent reproduction.

Consequently, conservation planning should consider demographic structure rather than simply total population size. A population containing few reproductive females may remain vulnerable even when its numerical size appears stable.

Ecological Role

As a large herbivore, Asiatic wild buffalo can influence the structure and functioning of grassland and wetland ecosystems. Grazing may reduce the dominance of tall or coarse vegetation and maintain areas of shorter vegetation that can be used by other herbivores. The species' movements between water bodies and grasslands can also redistribute nutrients across habitats.

Wallowing has the potential to increase local habitat heterogeneity by creating or maintaining small depressions containing water or moist substrates. Such features may provide resources for aquatic organisms and contribute to the structural complexity of wetland systems. However, the magnitude of these effects in *B. arnee* populations remains less well documented than the general ecological effects of other large herbivores, and further field research is required.

Dung deposition contributes to nutrient cycling and provides resources for dung-associated organisms, while movement through vegetation may contribute to seed dispersal. These functions support the interpretation of wild buffalo as an ecologically important megaherbivore rather than simply as a large grazing species.

The potential ecosystem level effects of wild buffalo restoration are particularly relevant at Kanha. The 2024 feasibility study concluded that reintroduction could contribute to the restoration of grassland and swamp

habitats and complement existing conservation efforts for other grassland dependent wildlife (Bora *et al.*, 2024). The study specifically identified wild buffalo as an important ecosystem engineer whose restoration could help recover ecological functions lost from the landscape. Thus, restoring *Bubalus arnee* should be considered not only as a species-recovery measure but also as a potential ecosystem-restoration intervention.

Major Threats

The threats affecting Asiatic wild buffalo are interconnected. Habitat loss reduces population size; fragmentation restricts dispersal; livestock contact increases competition and disease risk; hybridization may compromise genetic integrity; and small population size magnifies demographic and genetic vulnerability (Table 02). Conservation therefore requires simultaneous management of several pressures rather than addressing individual threats in isolation.

Habitat loss and fragmentation

Conversion of grasslands, wetlands and floodplains to agriculture and human settlements has been a major driver of decline. Encroachment, infrastructure development and altered grassland management can reduce both habitat quantity and quality. Fragmentation also restricts movement between populations and reduces opportunities for natural gene flow (Choudhury, 1994; Aryal *et al.*, 2011).

The conservation priority should therefore shift from protecting isolated habitat patches toward maintaining functional landscapes containing forage, water and movement opportunities.

Hunting and human-wildlife conflict

Historical hunting for meat, horns and sport contributed substantially to population decline. Although legal protection has greatly reduced the legitimacy of hunting, illegal killing and retaliatory mortality remain potential threats where buffaloes enter agricultural areas (Choudhury, 1994; Mishra *et al.*, 2021).

Conflict mitigation should therefore combine compensation mechanisms, community participation, crop protection and rapid response rather than relying exclusively on enforcement.

Livestock competition and disease

Domestic cattle and buffaloes may compete with wild buffaloes for forage and water. More importantly, close contact creates opportunities for pathogen transmission. Diseases of concern include foot-and-mouth disease and other livestock-associated infections.

Disease management should consequently operate at the wildlife-livestock interface. Livestock vaccination, veterinary surveillance, management of livestock movement and reduction of livestock grazing inside core wildlife habitat can reduce epidemiological risks (Aryal *et al.*, 2011; Mishra *et al.*, 2021).

Genetic introgression

Hybridization with domestic buffalo represents one of the most distinctive conservation challenges for Asiatic wild buffalo. Domestic and wild buffaloes can occur in proximity, allowing interbreeding and potentially altering the genetic composition of wild populations.

Genetic research has demonstrated relationships among wild, river and swamp buffalo lineages and has emphasized the importance of molecular assessment in conservation planning (Mishra et al., 2015). Mitochondrial genome research has also demonstrated the value of molecular approaches for characterizing wild buffalo populations and supporting taxonomic assessment (Pacha et al., 2021).

Importantly, conservation genetics should not be reduced to a simple search for "pure" animals. Founder selection should consider genetic ancestry together with genetic diversity, health, demographic suitability, natural behaviour and the conservation consequences for the source population. The objective is to establish populations that are both genetically appropriate and demographically viable (Mishra and Gaur, 2019).

Small population size and isolation

Small populations are vulnerable to demographic stochasticity, inbreeding, disease outbreaks and environmental fluctuations. Fragmentation further limits natural dispersal and gene flow. These problems are particularly important in central India, where the remaining population has been considered at high risk of local extinction (Mishra and Gaur, 2019; Bora et al., 2024).

Population augmentation can therefore be justified when a source population can withstand removal of individuals and when the destination has sufficient habitat, protection and ecological suitability. Such interventions must nevertheless be accompanied by long-term demographic and genetic monitoring.

Conservation Strategies

Conservation of Asiatic wild buffalo requires coordinated in-situ and ex-situ measures. Habitat protection should remain the foundation because translocation cannot compensate for the absence of suitable habitat. Protection and restoration of grasslands, wetlands and water sources, management of invasive vegetation and prevention of excessive livestock grazing are therefore essential (Mishra et al., 2021; Bora et al., 2024).

Disease management should focus on the wildlife-livestock interface. Veterinary surveillance and livestock vaccination can reduce pathogen transmission, while regulated grazing and livestock movement can reduce contact between domestic and wild animals (Aryal et al., 2011).

Genetic monitoring is increasingly important for both existing populations and restoration programmes. Molecular screening can help identify hybridization, characterize population structure and inform founder

selection. Genetic information should therefore be incorporated into translocation decisions rather than treated as a separate research activity (Mishra et al., 2015; Mishra and Gaur, 2019).

Translocation and reintroduction

Translocation is particularly important where populations have become locally extinct but suitable habitat remains. However, successful reintroduction depends on several conditions: adequate habitat, a sufficiently large founder population, appropriate genetic composition, disease screening, minimal human disturbance and long-term post-release monitoring.

Research published in Restoration Ecology identified approximately 390 km² of potentially suitable habitat in Kanha Tiger Reserve. The study concluded that the habitat could potentially support approximately 200 wild buffaloes, while genetic analyses indicated that Indian wild buffaloes formed a distinct cluster and that northeastern animals could serve as potential founders (Bora et al., 2024).

This evidence provided an important scientific basis for restoring the species in central India. It also demonstrates why reintroduction should be preceded by habitat modelling, forage assessment, carrying-capacity estimation and genetic evaluation rather than based solely on historical occurrence.

An earlier conservation intervention involved the translocation of two wild buffaloes from Manas National Park, Assam, to the Conservation Breeding Centre at Barnawapara Wildlife Sanctuary, Chhattisgarh, as part of the Central India Wild Buffalo Recovery Project. Such programmes demonstrate the importance of integrating translocation with habitat management, veterinary care, genetic assessment and post-release monitoring (Wildlife Trust of India, 2020).

The 2026 Kaziranga–Kanha restoration initiative

A major conservation initiative was undertaken in 2026 to restore wild buffaloes to their former range in central India through translocation from Kaziranga Tiger Reserve, Assam, to Kanha Tiger Reserve, Madhya Pradesh. The programme was implemented by the Assam and Madhya Pradesh Forest Departments with technical and knowledge support from the Wildlife Institute of India and Wildlife Trust of India. The initiative represents a significant shift from conserving the species within its remaining strongholds toward actively restoring a locally extinct population (Wildlife Trust of India, 2026).

In April 2026, the first four animals, comprising one male and three females, were transported approximately 2,000 km to Kanha. They were placed in a holding enclosure for health monitoring and acclimatisation before soft release. The initiation of the Kaziranga-to-Kanha translocation has been reported as a major milestone in the restoration of wild buffaloes to their ancestral range (Wildlife Trust of India, 2026).

A further four animals were transferred in May 2026 as the second phase of the programme. The phased approach allows veterinary assessment, acclimatisation and monitoring while progressively building the founder population.

The broader initiative aims to establish a viable wild buffalo population at Kanha, with up to 50 animals planned for translocation in successive phases (Wildlife Trust of India, 2026).

The importance of this initiative extends beyond the number of animals moved. If successful, Kanha could provide an important additional conservation landscape outside the principal northeastern concentration. The project therefore has the potential to reduce geographic concentration risk, restore a historically lost population and re-establish ecological functions associated with a large native grazer.

At the same time, the translocation itself should not be regarded as the endpoint of conservation. The critical measures of success will be survival, reproduction, genetic stability, habitat use, dispersal, disease status and long-term population growth. Consequently, the Kanha project should be treated as a long-term ecological restoration programme rather than a one-time wildlife transfer.

Conservation breeding

Conservation breeding can provide an additional safeguard for extremely small populations, particularly where demographic or genetic rescue is urgently required. However, it should not replace protection of free-ranging populations.

Captive programmes should maintain detailed pedigree and genetic records, screen founders for domestic introgression and avoid inadvertent selection for captive-adapted traits. Where possible, conservation breeding should ultimately support the establishment or reinforcement of viable free-ranging populations (Mishra and Gaur, 2019).

Future Research Priorities

Despite recent advances in Asiatic wild buffalo research and conservation, critical knowledge gaps remain that may constrain effective species recovery and long-term management.

A fundamental priority is to improve the reliability of population assessment. Population estimates should use standardized methods capable of distinguishing apparently wild animals from individuals with evidence of genetic admixture. Population size alone is insufficient unless demographic structure, reproductive output and genetic composition are also considered.

Genetic research represents another major priority. Genetic diversity, population structure and the extent of domestic introgression are needed to clarify genetic diversity. Such research could improve founder selection and identify populations that may require genetic

management or, where appropriate, genetic rescue (Mishra et al., 2015; Pacha et al., 2021).

Long-term monitoring of translocated animals is equally important. Satellite telemetry, camera trapping, genetic sampling, health screening and reproductive monitoring can provide information on survival, dispersal, habitat use and population establishment. The Kanha programme provides a particularly valuable opportunity to generate long-term evidence on the ecological and demographic outcomes of restoring a large herbivore to a historically occupied landscape. Disease surveillance should be integrated into these monitoring programmes, particularly where wildlife and livestock share grazing or water resources. Establishing baseline health data before translocation and continuing surveillance after release will be essential for detecting emerging disease risks.

The influence of climate change also warrants greater attention. Altered rainfall patterns, drought frequency, flooding regimes, water availability and grassland productivity may influence future habitat suitability for wild buffalo. Climate projections should therefore be incorporated into future habitat-suitability assessments and restoration planning.

Equally important are the human dimensions of wild buffalo conservation. The long-term persistence of wild buffalo is likely to depend not only on protected-area management but also on cooperation from communities living around conservation landscapes. Compensation mechanisms, livestock management, local participation and conflict mitigation should therefore be evaluated as integral components of species recovery.

CONCLUSION

The Asiatic wild buffalo is an ecologically important megaherbivore whose present conservation status reflects extensive historical range contraction and continuing fragmentation of its remaining populations. Although substantial populations persist in parts of northeastern India, the species remains vulnerable because a large proportion of its global population is concentrated in a limited number of landscapes. Small and isolated populations in central India face particularly serious demographic, genetic and habitat-related risks.

The conservation challenge has therefore moved beyond simply preventing extinction. The broader objective is to establish multiple, self-sustaining, genetically appropriate and geographically distributed populations across suitable parts of the species' former range. Achieving this will require an integrated approach combining habitat restoration, genetic assessment, disease surveillance, livestock management, community participation, conservation breeding and scientifically planned translocation.

The restoration initiative at Kanha represents an important step in this broader conservation transition. The transfer of wild buffalo from Kaziranga to Kanha demonstrates the

practical application of ecological and genetic assessment to restore the species to a landscape from which it had disappeared. Its long-term significance, however, will depend on whether the founder population survives, reproduces and develops into a viable and self-sustaining population.

More broadly, Asiatic wild buffalo conservation illustrates a shift from conventional species protection toward active ecological restoration. Protecting remaining populations in Assam, Nepal and other range countries remains fundamental, but restoring suitable parts of the

historical range may also reduce extinction risk and recover ecological functions associated with the species.

Ultimately, conserving wild buffalo will require a landscape-scale approach in which genetic integrity, demographic viability, habitat quality and ecological function are treated as interconnected objectives. If these elements are successfully integrated, recovery of the Asiatic wild buffalo could contribute not only to securing an endangered megaherbivore but also to restoring and maintaining the grassland and wetland ecosystems with which it is ecologically associated.

REFERENCES

1. Aryal, A., Shrestha, T.K., Ram, A., Frey, W., Groves, C., Hemmer, H., Dhakal, M., Koirala, R.K., Heinen, J.T. and Raubenheimer, D. (2011). A call to save the wild water buffalo (*Bubalus arnee*) in Nepal. *International Journal of Conservation Science*, 2: 161–168.
2. Bora, J.K., Vardhan, V., Vijh, R.K., Deshmukh, A.V., Srinivas, Y., Mungi, N.A., Goswami, S., Jhala, H., Chauhan, J.S., Kumar, U. and Jhala, Y. (2024). Evaluating the potential for reintroducing the endangered wild water buffalo (*Bubalus arnee*) in Kanha National Park, central India. *Restoration Ecology*, 32(3): e14079.
3. Choudhury, A. (1994). The decline of the wild water buffalo in northeast India. *Oryx*, 28(1): 70–73.
4. Groves, C.P. and Grubb, P. (2011). *Ungulate Taxonomy*. Johns Hopkins University Press, Baltimore, 317 pp.
5. Mammal Diversity Database (MDD). (2026). *Bubalus arnee* (Kerr, 1792), Asian Wild Buffalo. Mammal Diversity Database, Version 2.5. American Society of Mammalogists.
6. Mishra, B.P., Dubey, P.K., Prakash, B., Kathiravan, P., Goyal, S., Sadana, D.K., Das, G.C., Goswami, R.N., Bhasin, V., Joshi, B.K. and Kataria, R.S. (2015). Genetic analysis of river, swamp and hybrid buffaloes of north-east India throw new light on phylogeography of water buffalo (*Bubalus bubalis*). *Journal of Animal Breeding and Genetics*, 132(6): 454–466.
7. Mishra, R.P. and Gaur, A. (2019). Conservation Status of Asiatic Wild Buffalo (*Bubalus arnee*) in Chhattisgarh Revealed through Genetic Study. Wildlife Trust of India and CSIR-CCMB, India, 17 pp.
8. Mishra, R.P., Sircar, D., Poddar, A. and Sinha, S.K. (2021). Introduction. In: Menon, V., Kaul, R., Ashraf, N.V.K. and Chaudhary, R.G. (eds.), *Back from the Brink: Reviving the Wild Buffalo Population in Central India*. Wildlife Trust of India, Noida, India, pp. 11–23.
9. Pacha, A.S., Nigam, P., Pandav, B. and Mondol, S. (2021). Sequencing and annotation of the endangered wild buffalo (*Bubalus arnee*) mitogenome for taxonomic assessment. *Molecular Biology Reports*, 48(2): 1995–2003.
10. Prater, S.H. (2005). *The Book of Indian Animals*. 3rd edn. Bombay Natural History Society, Mumbai, pp. 247–248.
11. Shrestha, T.K., Hecker, L.J., Aryal, A. and Coogan, S.C.P. (2020). Feeding preferences and nutritional niche of wild water buffalo (*Bubalus arnee*) in Koshi Tappu Wildlife Reserve, Nepal. *Ecology and Evolution*, 10(14): 6897–6905.
12. Wildlife Trust of India. (2020). WTI assists in wild buffalo translocation to Chhattisgarh. Wildlife Trust of India. Online <https://www.wti.org.in/>
13. Wildlife Trust of India. (2026). From Kaziranga to Kanha: Wild Buffaloes Embark on a Historic Translocation Journey. 28 April 2026. Online <https://www.wti.org.in/>

Table- 1: Current distribution and conservation tatus of the Asiatic wild buffalo (*Bubalus arnee*)

Country/ Region	Current distribution	Major populations	Key conservation concerns
India	Largest remaining populations; mainly northeastern and central India (Choudhury, 1994; Bora <i>et al.</i> , 2024)	Kaziranga, Manas, Orang, Dibru-Saikhowa, Laokhowa-Burachapori; Udanti-Sitanadi and Indravati	Habitat fragmentation; livestock disease; introgression; human-wildlife conflict
Nepal	Small, restricted population (Aryal <i>et al.</i> , 2011)	Koshi Tappu Wildlife Reserve	Small population; habitat degradation; disease; introgression
Bhutan	Restricted/uncertain occurrence	Royal Manas National Park and adjoining Manas landscape	Uncertain status; habitat fragmentation; genetic introgression
Myanmar	Highly restricted and poorly documented	Rakhine Yoma and other suitable habitats	Hunting; habitat loss; small population size; introgression
Thailand	Highly restricted population	Huai Kha Khaeng Wildlife Sanctuary	Small population; fragmentation; genetic introgression
Cambodia	Severely reduced and fragmented	Mondulkiri and adjoining northeastern landscapes	Hunting; habitat loss; small population size; uncertain genetic status
Overall	Endangered; highly fragmented range (MDD, 2026)	India supports the largest remaining populations	Habitat loss; hunting; disease; introgression; demographic isolation

Table -2: Major threats to *Bubalus arnee* and Recommended Conservation responses

Major threat	Potential impact	Priority conservation response	Conservation objective
Habitat loss and fragmentation	Reduces suitable habitat and connectivity	Restore grasslands/wetlands and maintain habitat corridors	Maintain viable habitat
Agricultural expansion	Reduces natural forage and increases crop conflict	Protect buffer habitats and improve conflict mitigation	Reduce habitat conversion
Livestock competition	Limits access to forage and water	Regulate grazing and maintain livestock-free core areas	Reduce competition
Disease transmission	Increases risk of livestock-associated infections	Disease surveillance and livestock vaccination	Protect population health
Genetic introgression	May reduce genetic integrity of wild populations	Genetic screening and management of domestic buffalo contact	Maintain appropriate genetic composition
Hunting and conflict	Causes direct mortality	Anti-poaching measures and community participation	Reduce human-caused mortality
Small population size	Increases demographic and genetic risks	Genetic monitoring and carefully planned population augmentation	Establish viable populations
Invasive plants and altered fire regimes	Can alter grassland structure and forage availability	Invasive species and fire management	Maintain suitable habitat
Climate change	May alter water, forage and wetland availability	Long-term ecological monitoring and adaptive habitat management	Increase resilience
Poorly planned translocation	May introduce disease, unsuitable genotypes or demographic problems	Genetic check-up/health screening and post-release monitoring	Ensure restoration success