



Government of India



Guidelines for Human–Elephant Conflict Mitigation

Taking a Harmonious–Coexistence Approach



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Ministry of Environment, Forest and Climate Change



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Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	IUCN	International Union for Conservation of Nature
CCTV	Closed-circuit television	JFM	Joint Forest Management
CWLW	Chief Wildlife Warden	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-governmental organisation
DFO	Divisional Forest Officer	NTCA	National Tiger Conservation Authority
DLCC	District-Level Coordination Committee	NTG	National Technical Group
EDC	Eco-development Committee	NWAP	National Wildlife Action Plan
EIA	Environmental impact assessment	OPs	Operating procedures
EWRR	Early Warning and Rapid Response	PA	Protected area
GIS	Geographical information system	PCCF	Principal Chief Conservator of Forest
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PPE	Personal protective equipment
Gol	Government of India	PRT	Primary Response Team
HEC	Human–Elephant conflict	RFID	Radio frequency identification
HOFF	Head of Forest Force (in a state)	RRT	Rapid Response Team
HWC	Human–wildlife conflict	SDRF	State Disaster Response Force
HWC-MAP	Human–Wildlife Conflict Management Action Plan	SFD	State forest department
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SHG	Self-help group
HWC-SAP	State-Level HWC Mitigation Strategy and Action Plan	SLCC	State-Level Coordination Committee
IFS	Indian Forest Service	SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About The Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	6
1.4 Legal and Policy Framework for Implementing the Guidelines	6
1.5 Institutional Mechanism for Implementing These Guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of HEC	8
3.1 Overview	8
3.2 Management-relevant Response for Addressing the Drivers and Pressures	8
3.3 Institutional Capacity Development for Addressing the Drivers and Pressures	12
4. Deploying Measures to Prevent Human–Elephant Conflicts	15
4.1 Differential Mitigation Approach for Different HEC Location Scenarios	15
4.2 Identification of HEC Hotspots	15
4.3 Effective Use of Early Warning and Rapid Response System at HEC Hotspots	16
4.4 Monitor and Document ‘Potential Elephant-in-Conflict’ in the Landscape	16
4.5 An integrated Approach to Managing Potential Elephants-in-Conflict	16
4.6 Managing Dispersing Elephants	17
4.7 Judicious Use of Barriers, Taking a Landscape Approach	17
4.8 Judicious Use of Other Exclusionary Measures, Taking a Harmonious-Coexistence Approach	18
4.9 Support Local Population in Crop-Guarding Methods	18
4.10 Addressing Zoonotic and Other Emerging Diseases, Adopting a One Health Approach	18
5. Addressing the Emergency Situations Arising due to HEC	19
5.1 Preparedness Measures – Before an Emergency Situation Arises	19
5.2 Measures During an Emergency Situation	19
5.3 Measures After an Emergency Situation	20
6. Reducing the Impact of HEC on Health and Overall Well-being of the Affected Humans	21
6.1 Addressing the Situation of Loss of Human Life	21
6.2 Addressing Health and Overall Well-being of the Affected Humans	21
6.3 Addressing the Situation of Property Damage	22
6.4 Addressing the Situation of Crop Damage and Livestock Injury/Loss	22
6.5 Addressing the Situation of Lost Livelihood Opportunities	22
7. Reducing the Impact of HEC on the Health and Well-being of Elephants	23
7.1 Addressing the Health of an Elephant During Capture and Post-capture Operations	23
7.2 Release Essentials	24
7.3 Rehabilitation of the Captured Elephant	24
7.4 Managing Orphaned/Straying Elephant Calves-in-Conflict	25
7.5 Radio Collaring or Tagging (RFID-Microchip) the Elephant	25
7.6 Health and Well-being of Private and Temple Elephants	25
8. Use of Learnings from the Guidelines to Further Strengthen Institutional and Policy Framework on HEC Mitigation in India	26
9. Process of Development, Pilot Testing of These Guidelines and Consultation Process	26
10. Monitoring and Evaluation of Guidelines	26
Annexe 1	27
National Technical Group (NTG)	27
Working Group on Pilot Implementation of Guidelines and HWC-NAP	27
Author Group for drafting the guidelines	27

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- The Guidelines on Human–Elephant Conflict (HEC) Mitigation get the overall context from the Wild Life (Protection) Act 1972, National Wildlife Action Plan (2017) ¹, Human–Elephant Conflict Guidelines (2017), Advisory to deal with human wildlife conflicts (MoEFCC 2021) and National Human–Wildlife Conflict Mitigation Strategy and Action Plan (HWC-NAP) ². HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines.
- This document takes into consideration the existing guidelines,³ advisories and good practices on HEC mitigation ⁴ issued by Project Elephant and various state forest departments and builds on them to bring about a more holistic approach to HEC mitigation.

1.2 PURPOSE AND SCOPE

- These guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HEC in India, leading to co-existence, and to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and Elephants.
- These guidelines provide advice on mitigation measures to address HEC in the long term, as well as facilitate the development, assessment, customisation and evaluation of site-specific HEC mitigation measures that are effective and wildlife-friendly.
- These guidelines serve as a basis for overall long-term planning and coordination of HEC mitigation measures at the national, state and division levels.
- In general, these guidelines apply to all stakeholders involved in HEC mitigation and are not only limited to state forest departments (SFDs).

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence⁵ approach to ensure that both humans and Elephants are protected from the negative impacts of HEC.
- The guidelines address the issue of HEC, adopting a holistic approach. The holistic approach of the guidelines entails not only addressing the emergency situations arising due to immediate conflict situations but also addressing the drivers and pressures that lead to HEC; providing guidance on establishing and managing prevention methods; and reducing the impact of the conflict on both humans and Elephants.

- The development of these guidelines and the intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HEC mitigation measures with key sectors and stakeholders at national, state and local levels.
- The guidelines reflect on the need for a landscape approach while formulating measures for mitigating HEC to ensure sustainable solutions as unless comprehensive and integrated HEC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementation through provision of *Implementer's Toolkit*, which includes operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act 1972.
- The following laws are considered directly relevant for conservation when dealing with HEC:
 - Wild Life (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HEC.
- The Supplementary Framework to HWC-NAP on Legislative Framework ⁶ for HWC Mitigation in India is to be referred to for more details on the specific legal provisions related to HWC mitigation.
- Other important legislations that facilitate conservation when dealing with HEC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; Electricity Act, 2003; Railways Act, 1989; National Highways Act, 1956; and Disaster Management Act, 2005.

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTATION OF THESE GUIDELINES

- The institutional mechanism outlined in HWC-NAP will be followed for implementing these guidelines.

1 MoEFCC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 MoEFCC (2008). Guidelines for care and management of captive elephants. 8 January 2008. Project Elephant Division, Ministry of Environment, Forests and Climate Change, New Delhi. [http://moef.gov.in/division/forest-divisions-2/project-elephant-pe/new-guidelines/MoEFCC \(2017\). Guidelines for Management of HECs. 2017. Project Elephant Division, Ministry of Environment, Forests and Climate Change, New Delhi. <http://moef.gov.in/wp-content/uploads/2019/08/01-HEC-guidelines.pdf>](http://moef.gov.in/division/forest-divisions-2/project-elephant-pe/new-guidelines/MoEFCC%20(2017).Guidelines%20for%20Management%20of%20HECs.2017.Project%20Elephant%20Division,%20Ministry%20of%20Environment,%20Forests%20and%20Climate%20Change,%20New%20Delhi.%20http://moef.gov.in/wp-content/uploads/2019/08/01-HEC-guidelines.pdf)

Standards/ Norms for Recognition of Elephant Rehabilitation/ Rescue Centres under Section 42 of Wildlife Protection Act, 1972 (F.No. 2-5/ 2006-PE [Vol. II]), Government of India, Ministry of Environment, Forest and Climate Change, Project Elephant Division. 29 Sept 2017. <http://moef.gov.in/wp-content/uploads/2019/08/02-Standards-Norms-for-Elephant-Rehab.-2_compressed.pdf>

4 MoEFCC (2020). Best Practices of HEC Management in India. 2020. Project Elephant Division, Ministry of Environment, Forests and Climate Change, New Delhi. <http://moef.gov.in/wp-content/uploads/2020/08/Best-Practice-Man-Animal-Conflict.pdf>

5 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human-wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and that of humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

6 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2. CONTEXT AND SITUATION

- The Indian Elephant (*Elephas maximus*) is a keystone species affecting habitats and ecosystems in significant ways, ensuring ecological balance and resulting ecosystem services for human well-being. Elephants are referred to as ecosystem engineers due to their transformative role in the ecosystems where they create water holes that are also used by other wildlife for their survival during dry season, clear understories to promote new plant growth in forests, and facilitate seed dispersal of several important tree species, due to their highly mobile nature.
- The Elephant is recognised as a National Heritage animal and is deeply rooted in our culture. India holds by far the largest number of wild Asian Elephants, estimated at about 29,964 ⁷, this is nearly 60% of the population of the species. The Elephant is placed under Schedule I and Part I of the Indian Wild Life Protection Act (1972), which confers it the highest level of protection. However, Elephants and humans are now often in conflict in our country because of varied reasons.
- HEC refers to the negative interaction between humans and Elephants, leading to adverse impacts such as injury or loss of human lives, crop, livestock and other properties, or even their emotional well-being, and equally negative impacts on the Elephant or its habitats.
- The general drivers of HEC include a human population increase, changing lifestyle and economic aspirations, reduced appreciation of wildlife, climate change, disasters, land use change, policies in linear infrastructure, mining, urban development, habitat fragmentation, loss and degradation including local overabundance of Elephants. Among these, the increase in human population, land use change, changing lifestyle and economic aspirations, policies in linear infrastructure, mining, habitat fragmentation, loss and degradation have the greatest impact.
- The intensity of HEC is highly variable, ranging from very occasional to chronic, and depends on the density of Elephant populations; the nature of the interface between human areas and Elephant habitats; an irregular and diffuse boundary with a long perimeter; highly fragmented Elephant habitats interspersed with human-use areas; dispersing herds; railway tracks passing through forests with sizeable Elephant populations; etc.
- HEC is prevalent in many states and is particularly high, relative to the number of Elephants involved, in areas where Elephants have dispersed and areas that Elephants have colonised. It is estimated that approximately 500 persons and more than 100 Elephants are killed annually. Nearly 0.8 to 1 million ha of agriculture land may be impacted by crop damage due to Elephants, and nearly a million families are adversely affected due to HEC. The challenge extends to the transboundary Elephant populations of Bhutan, Nepal and Bangladesh.
- HEC mitigation so far has largely focused on the use of barriers, short-distance drives, and ex gratia payments or compensation for loss and damages. While these efforts have helped contain HEC, the problem continues to grow as a holistic approach has not been incorporated into the mitigation effort.

⁷ MoEFCC (2017). Synchronized Elephant Population Estimation India 2017. Project Elephant Division, Ministry of Environment, Forests and Climate Change, New Delhi

3. ADDRESSING THE DRIVERS AND PRESSURES OF HEC

3.1 OVERVIEW

A major gap involves effective problem analysis to identify drivers and pressures of conflict which would allow appropriate selection of mitigation measures.

- An assessment of long-term outcomes and implications of all mitigation methods is needed to identify effective and Elephant -friendly mitigation measures to address HEC. For this, a systematic analysis of HEC mitigation methods should be done to assess their effectiveness and wildlife-friendliness in different types of conflict situations.
- This will facilitate the necessary customisation and adaption of the mitigation measures/combining two mitigation measures to achieve the best possible impacts in the field.

The HWC-NAP recommends a holistic approach to HWC mitigation by considering and addressing the thematic triangle of drivers–prevention–damage mitigation, these guidelines are prepared in line with the recommended holistic approach to bridge the current gap.

- The need to identify Elephant range areas and corridors in a state is the first step. Thereafter, in and around all such areas the drivers as aforementioned should be identified and addressing these drivers should be a priority in the state-level planning in order to avoid future impacts. Similarly, at the district-level planning, the impact of these drivers to be ascertained to avoid escalating HEC in the area.

Addressing the drivers and pressures includes responses that are directed towards:

- Management-relevant response for addressing the drivers and pressures
- Institutional capacity development for addressing the drivers and pressures

3.2 MANAGEMENT-RELEVANT RESPONSE FOR ADDRESSING THE DRIVERS AND PRESSURES

3.2.1 ZONATION IN ELEPHANT RESERVES

- The current land use and land cover and inherited land use changes have caused Elephant habitats to become habitat islands of various sizes within a sea of human-use areas, thus creating areas where Elephants and humans compete for space and resources inside Elephant reserves.

- Elephants, because of their adaptability, have also exploited opportunities to occupy plantation crops such as tea and coffee and thus overlap with humans in human use areas. Elephants have also adapted to fragmented landscapes by transiting through human-use areas to use spatially separated habitat patches. Some have adapted to using small habitat patches, a few hectares in extent, as daytime refuges to forage on the agricultural crops in the surrounding areas at night.
- All these factors have created different types of conflict situations between humans and Elephants; such situations have varying degrees of management feasibility, viz, sometimes these are easily manageable, sometimes situations require significant intervention and sometimes there are situations where keeping Elephants in unviable habitat patches is not possible for various reasons.
- Zonation, a management entity, takes into consideration the fact that resources available are limited and if these are not prioritised and optimally used, the conflict will intensify and the overall conservation benefits will be minimised. Zonation will allow a science-based and pragmatic approach to landscape level planning for conservation and HEC mitigation. Zonation should be based on Elephant population viability analysis in each prescribed zone. The zonation suggested in these guidelines reinforces the recommendations made by the Karnataka Elephant Task Force (appointed by the Karnataka High Court) and can be as follows:
 - **Elephant Conservation Zones**, where primarily Elephant conservation takes priority over competing livelihood goals (a smaller subsection of our forests where human presence and resource extraction are absent): Areas where there is adequate habitat to support a viable Elephant population with no human settlements, and communities have no rights or dependencies on the forest. If any minor dependencies exist along the interface area, they should be such that they can be easily settled through negotiations.
 - **Elephant–Human Coexistence Zones**, where Elephant conservation and human livelihoods have to be balanced and reconciled (which would constitute the bulk of the forests): Areas where there is adequate habitat to support a viable elephant population where the movement of the Elephants is restricted to the interface area. There may or may not be human settlements inside the

forest, but communities have rights to resource extraction from the forests. The extraction of resources from the forests should be sustainable so that it does not degrade the Elephant habitat and escalate HEC.

- **Elephant Exclusion Zones**, areas where Elephants do not have adequate natural habitats and are dependent on crops for survival, and hence effective conflict mitigation would not allow Elephants to survive in such areas. In such areas concerns of human safety and livelihood take precedence over competing conservation concerns about Elephants, as Elephant populations in such areas may not be viable in the long term. Elephants in such areas need to be translocated, and after translocation, further colonisation of such areas should be stopped through proper HEC mitigation strategies.

3.2.2 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

- There is a clear need to have a more holistic understanding of HEC and its implications for humans and Elephants. Monitoring and addressing habitat loss, fragmentation and degradation may play an important role in understanding and mitigating HEC. Therefore, the following measures should be envisaged:
- Mapping of existing drivers and pressures of conflict such as linear infrastructure, mining, encroachments, settlements within forests, and resource use by local communities.
- Ensuring that all forest boundaries are clearly demarcated and patrolled on regular basis including monitoring deemed forest areas, forests on revenue land and private forest areas that form part of the Elephant range.
- Managing Elephant habitats in regions where the bulk of the forests are under the management of district councils and local bodies (where the SFDs have restricted control) requires active participation of communities and proper land use planning by:
 - Mapping the Elephant distribution and numbers in community forest areas with a population and habitat viability analysis to determine where and what can be conserved
 - Mapping land tenure and identification of communities who are stakeholders in the land
 - Consultation with local communities to facilitate Elephant conservation

- Engaging various line departments who can facilitate in enhancing or improving livelihood options that reduce the extent and intensity of slash and burn agriculture and thus bring about Elephant-compatible land use
- Facilitating capacity development of the forest department, line departments, local communities and all key stakeholders
- Preparing, implementing and periodically updating long-term perspective plans such as state-level human-wildlife conflict mitigation strategies and action plans (HWC-SAP) and division-level HWC management action plans. A common framework for developing these plans is provided in the supplementary frameworks to the HWC-NAP⁸.

- Developing synergies and facilitating integrated land-use planning for effective implementation of planned measures, through the State-level Coordination Committees (SLCC), Multi-stakeholder Fora at the state level, Joint Working Groups with key departments and agencies at the landscape level, and the District-level Coordination Committees (DLCC).
- Developing innovative firefighting strategies and equipment, using RS technology, etc. and engaging the local community, especially the community-level Primary Response Teams (Community PRTs).
- Facilitating long-term studies to understand the impact of these measures in addressing the drivers in the landscapes

3.2.3 HABITAT RESTORATION AND RECLAMATION OF DIVERTED FOREST LAND

- Habitat restoration requires that the driver of habitat degradation be first addressed so that the process of degradation does not continue. The following measures are envisaged:
- SFDs should prioritise restoration in and around vulnerable areas and HWC hotspots.
- In highly degraded habitats the process of regeneration may be accelerated by interventions such as gap planting with native species, controlling soil erosion, ground water recharging, restoring grasslands and tree cover, etc.
- Many Elephant ranges have large monoculture plantations. They may not be optimal habitats for wildlife, and therefore the native vegetation needs to be restored by preparing ecologically sound plans in the interest of habitat improvement and HEC mitigation.

8 Supplementary frameworks to the HWC-NAP <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

- SFDs may work with mining project proponents to reclaim and restore old mining sites.
- In many regions across India, tea, coffee, rubber and cardamom estates within Elephant landscapes are unutilised; such areas can be restored/reclaimed for Elephant conservation.

3.2.4 REMOVAL OF INVASIVE PLANT SPECIES IN AND AROUND HEC HOTSPOTS INCLUDING VISTA CLEARANCE

There may be suppression and reduction of indigenous plants due to the presence of invasive alien species in the area resulting in decreased habitat quality, leading to increased movement of Elephants outside the forested landscapes, subsequently leading to increased HEC. The following measures may be implemented:

- Mapping invasive species cover and abundance in the landscape and the herbivore use of the landscape and accordingly implementing habitat management plans.
- Exploring the use of remote sensing data for mapping and managing invasive species.
- Prioritising sites for intervention based on hotspots of invasive species spread, areas critical for the Elephant (and other herbivores) and conflict hotspots, to ensure efficient mitigation, given the scale of the problem, and the challenges involved in containing and eliminating invasive species over large landscapes.
- Clearing vistas along the boundaries of forests in close proximity of the habitations for avoiding accidental encounters.
- SFDs may facilitate Panchayats in making the HEC hotspots adequately lit, by installing street/solar lights.

3.2.5 SECURING ELEPHANT CORRIDORS

Elephants have large home ranges, often with clear seasonal ranges and migration paths and fragmentation or blockage in their movement path will result in disruption causing conflict. In the document titled “Right of Passage – Elephant Corridors in India”, 101 corridors have been listed; however, there are likely to be additional corridors that need to be identified.

Hence, SFDs may start planning corridor conservation by taking into consideration the following:

- Initiate landscape level assessment of all constrictions in habitat and obstructions caused by linear infrastructure, using GIS and remote sensing tools to identify any new corridors. This should be supported by verification on the ground using the field staff.
- Corridor management strategies should be developed and incorporated into the working/management plans

and into the HWC Management Action Plans at division levels.

- Threats to the physical integrity (land use changes) of the corridor and to the free movement of Elephants (disturbances, degradation, etc) within the corridor should be identified and addressed.
- Corridors through tea/coffee estates which connect two or more large habitat patches should be secured.
- Restoration of habitats within the corridors, where possible, should be carried out.
- Support should be provided to PRTs and RRTs during the migration season.
- The feasibility of establishing community reserve or private conservancies should also be explored, with greater participation from community-based institutions and key stakeholders.
- In the case of private lands, the villagers may be incentivised to allow movement of Elephants.
- Awareness about Elephant ecology, behaviour and suitable mitigation measures to humans living in and around the corridor areas may be imparted, regularly.
- Address the issues of land tenure and land use in the corridor and existing linear infrastructure within the corridor area in order to secure its legal status and physical integrity.

3.2.6 REDUCE LIVELIHOOD DEPENDENCE OF HUMANS ON FORESTS

Communities living in proximity to the forest are dependent on forest biomass (fuel wood, NTFP, livestock grazing, etc), which is the primary reason for them to enter the forest. Accidental encounters of humans with Elephants inside forest areas can be prevented to a large extent by reducing the dependence of humans on forests. The following indicative measures may be implemented:

- Facilitate management interventions for better livelihood opportunities through community-participatory approaches including various eco-development measures and livelihood improvement programmes.
- Reduce the dependency of fringe forest communities on forests (e.g., cattle grazing, fodder collection, fuelwood collection, non-timber forest produce (NTFP) collection, right of way) by participatory forest management.
- Improve animal husbandry practices (promoting stall-feeding practices or incentivising improved livestock breeds)
- Address livelihood needs of communities by skill development, poverty alleviation and alternate income generation schemes of the government.

- Facilitate cross-sector linkages for community development (coordination and cooperation with line departments).
- Facilitate cooperation to integrate HWC mitigation planning at the district level, through measures including, but not limited to, dovetailing HWC mitigation measures with schemes relevant to community development.

3.2.7 SCIENTIFIC POPULATION MANAGEMENT AT INTERFACE AREAS OR CONFLICT HOTSPOTS

A local overabundance⁹ of wildlife including Elephants could be due to various factors including habitat loss, degradation and fragmentation, and an increase in population. The Elephant population in fringe forest areas have become habituated to humans and therefore there may be a proper understanding of the spatio-temporal distribution, foraging and ranging patterns and use of human-dominated landscape. The following measures are envisaged:

- Implementation of a robust population monitoring protocol at HEC hotspots, using trained field staff or in collaboration with research institutes or local universities/colleges.
- The dispersing Elephant population that has colonised new areas may be assessed for impacts on the well-being of the people and the Elephants.
- Understand the population dynamics of Elephant herds in the tea estates and coffee plantations, which continue to remain there as resident populations, and changes in their behavioural attributes.

3.2.8 MANAGING TRANSBOUNDARY AND INTERSTATE ELEPHANT MOVEMENT

- Some Elephant populations are known to regularly cross international and state boundaries. This occurs regularly on the international boundary with Nepal, Bangladesh, Bhutan and Myanmar. Elephant populations regularly cross interstate boundaries in many Elephant states such as Goa, Maharashtra, Northern Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, Himachal Pradesh, Haryana, Manipur and Mizoram and within southern states. The following measures are envisaged:
 - Within India, states sharing the Elephant landscape should meet at least annually and share information and plan for management of Elephants under the aegis of the National HWC Mitigation Forum using a common framework/approach to implement a coordinated strategy.
 - As to the transnational management and conservation of Elephants between neighbouring countries, the states sharing international boundaries should follow the protocol as agreed between the nations and communicated by the MoEF&CC.

3.2.9 EFFECTIVE GARBAGE MANAGEMENT AND SAFE SANITATION AROUND ELEPHANT HABITATS

Garbage is known to attract Elephants, and when garbage dumps are on the periphery or inside a village/town they create potential for accidental encounters between humans and Elephants. Unmanaged garbage may also habituate Elephants to moving and foraging in human-use areas, and as a consequence there may be high levels of conflict.

The vegetable and food waste generated in weekly markets in rural India and garbage thrown along roads and railway lines passing through forests attract Elephants. With a large number of humans moving around on foot or on two-wheelers, particularly in the evening after the rural markets, and Elephants also moving into the same area in the evening, accidental encounters happen. Accidental encounters also take place when truck drivers pass through forests, and also when they (truck drivers), and local people go into the forest for defecation, especially at dawn and dusk.

⁹ Local overabundance refers to occurrence, in a habitat, excessive number of individuals of a species beyond the normal population density, due to a variety of factors.

The following are indicative measures to address the situation:

- Ensure sustainable and ecologically sound waste- and garbage disposal by town municipalities and village panchayats bordering Elephant habitats
- Undertake periodic inspection of the forest perimeter near villages/towns to ensure that poor disposal of waste and garbage is detected early and brought to the notice of relevant local authorities. Volunteers can be engaged for this.
- Aversion conditioning measures may be implemented, in areas where Elephants have started foraging inside the boundary of villages and towns in search of forage and have grown accustomed to feeding on garbage.
- Community awareness including signages etc should be implemented to facilitate effective participation from local communities in garbage management.
- SFDs may also coordinate with municipalities/panchayats on garbage management and explore the possibility of building toilets under the Swachh Bharat Mission to prevent accidental encounters at HEC hotspots.

3.3 INSTITUTIONAL CAPACITY DEVELOPMENT FOR ADDRESSING THE DRIVERS AND PRESSURES

3.3.1 STRENGTHENING THE ROLE OF KEY STAKEHOLDERS

Local communities bear the direct brunt of loss of crops and human lives and other economic losses as a direct or indirect result of HEC. This has a direct impact on the wildlife and its habitat. The long-term engagement with local communities and other key stakeholders can be institutionalised and continued by adopting the following measures:

- Facilitate the establishment and effective steering of State-Level Coordination Committees (SLCC), a landscape-level multi-stakeholder forum, and District-Level Coordination Committees (DLCCs) to strengthen the inter-agency and cross-sector coordination and engagement of key stakeholders required for HEC.
- SFDs may support the community-level (village/ward) Primary Response Teams (PRTs) as the entry point for all community engagement work. Establishment and developing the capacity of PRTs should be in line with the Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams.

- Establish a platform where all community members, people's representatives and government agencies can interact and find solutions to mitigate conflict.
- Briefing of forest user groups, workers of tea and coffee plantations before every work season about Elephant risk and safety issues
- A campaign for creating awareness of Elephant may be instituted and communities also need to be educated to take responsibility in managing HEC. There is also a need to extend educational and awareness programmes for the development agencies, railways, power, irrigation, highways, mining companies, tourism industry, district administration, etc
- Plan and implement training programmes and other capacity development measures, extension programmes with school and college students, engage with women's self-help groups, Village Forest Committees (VFCs), Eco-development Committees (EDCs), Large Area Multipurpose Society (LAMPs), forest user groups, etc The EDCs/VFCs formed by the SFD in villages abutting the forest area in the periphery and zone of influence may be made functional and their sustainability ensured by accrual of benefits and incentives.
- Carrying capacity studies may be conducted to assess the tourism potential in the HEC hotspots.
- HEC mitigation measures should be developed with an inclusive and participatory approach.
- Ensure the participation of key stakeholders to ensure integration of traditional and local knowledge and experiences into the development of division-level HWC Management Action Plans (HWC-MAPs).

Tools for stakeholder engagement may be developed.

3.3.2 COMMUNITY AWARENESS AND COMMUNICATION MEASURES TO REDUCE THE RISK OF ACCIDENTAL ENCOUNTERS AND RETALIATION

Encounters with Elephants often take place in low light conditions, early in the morning or late in the evening, or when people enter the forests for NTFP or firewood collection, or Elephants enter the crop fields or get attracted by country liquor stored in houses. Knowledge of these factors can help prevent such encounters.

To facilitate effective engagement of local communities and various stakeholders in mitigation of HEC, it is extremely important to plan and implement awareness and sensitisation measures, taking a participatory approach.

- Appropriate community awareness and communication measures may be implemented at HEC hotspots, and their impacts may be assessed periodically to ensure that the awareness and communication measures are locally customised.
- The local communities at HEC hotspots may be advised to store grains in the granaries in pucca or underground structures. If necessary, communal granaries can be opted for.
- The local communities at HEC hotspots may be advised to avoid brewing indigenous liquor, which attracts wild Elephants to villages. Appropriate measures may be devised, together with the local administration, to implement this measure.
- Tools for developing, implementing and customising community awareness and communication measures may be developed.
- A standardised criterion for assessing the effectiveness and wildlife-friendliness of mitigation measures should be developed and used.
- The following research areas may be given higher priority for research and monitoring at HEC hotspots and the results from such studies may be consolidated at the national level to support further revision of these guidelines and strengthen the HEC mitigation measures:
 - Elephant responses to land use changes (mining, linear infrastructure) inside the forest
 - Elephant responses to changing cropping patterns and land use changes outside the forest
 - Differences between crop-foraging and non-crop foraging Elephants to understand what factors influence crop foraging behaviour
 - Status of Elephant populations along with demographic parameters
 - Impact of local overabundance on the habitat, population and HEC and impacts on other species
 - Efficacy of HWC mitigation tools and Elephants' responses to different methods (RRT/PRT interventions, barriers/deterrents, habitat interventions, etc)
 - How different mitigation measures impact Elephants (change in resource use, health and HEC)
 - Monitoring the efficacy of community capacity building exercises and how the threat perception has changed.

3.3.3 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HEC

HEC mitigation is a challenging issue, especially when adequate data on Elephant population density, Elephant demography, social and ranging behaviour of Elephants and its ecology are not available. Currently the data for assessing the impact of HEC are limited to the number of compensation claims paid, number of humans killed or injured, and the number of Elephants killed. There is, therefore, a need to constantly develop a knowledge base of subjects such as habitat usage, habitat connectivity, corridors, preferred or suitable habitat, home range, behaviour, attractions along the habitat and their movement paths.

Therefore, the following research topics are prioritised, which are expected to answer the existing management questions:

- Data on indirect costs of HEC (for example, abandoning agriculture due to HEC or human well-being, including stress, fear and restrictions on normal daily activities) may be gathered.
- Recording and analysing the data on long-term adverse impacts of HEC on Elephants (in terms of stress, reduction in reproductive fitness, loss of genetic diversity, etc.) and socio-economic impacts on families and communities may be done.
- SFDs may involve research institutions, non-governmental organisations (NGOs) and experts in carrying out result-oriented research on HEC status and mitigation measures besides undertaking in-house research.

3.3.4 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HEC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

Facilitating capacity development of SFDs, other line departments, local communities and all key stakeholders to ensure that a holistic approach can be followed.

Training of the field staff and response teams

- The SFDs should ensure that all response team personnel from forest and other line departments and agencies are brought under a systematic approach to capacity development, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*¹⁰

10 Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams available from <https://moef>.

- Arrangement for deployment of personnel and quick action on cognizance of conflict cases may be strengthened in each division
- The SFDs may sensitise all response teams and relevant personnel from forest and other line departments and agencies to the One Health approach, which can be used for planning and implementing measures related to occupational health and safety and humane treatment of animals in conflict.
- Regular and systematic training programmes on critical operations such as rescue, capture and translocation should be conducted jointly with other key relevant departments, in the form of mock-drills and simulation trainings.
- Advanced trainings on animal welfare issues should be conducted for all personnel of the RRTs.
- Competencies of members of RRTs to be reviewed on a regular basis and the curriculum for their training to be fine-tuned and updated regularly, in line with the Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams.
- The arrangement for deployment of personnel and quick action on cognizance of conflict cases may be strengthened in each division.

Training and support to mahouts and assistants

- SFDs may build the capacity of mahouts, incorporating learnings from Elephant behavioural studies for guiding *koonkie* Elephants in dealing with conflict mitigation.
- Trainings for mahouts from different states may be conducted, preferably in local languages, and developing trainers.
- States conducting regular trainings can act as regional hubs for imparting training to the other states in training the mahouts of *koonkie* Elephants.
- A database of experienced mahouts of *koonkie* Elephants may be developed and linked to the National HWC Mitigation Database.
- Steps may be envisaged for improving the service conditions of mahouts.

Training and support for daily wage workers/anti-poaching watchers

- SFDs may provide appropriate support and systematic training to daily wage workers and anti-poaching watchers on key HEC operations handled by them.
- Steps may be taken to improve their service conditions.

Support the local population in human safety by preventing accidental encounters with Elephants

- SFDs may facilitate, encourage and seek support from local NGOs, volunteers, schools, etc to implement safety measures, aiming at preventing human–Elephant encounters. These measures may include guiding people to watch for signs of Elephant presence during crepuscular period (around dawn and dusk), and how to respond when they encounter an Elephant. Regular trainings in local schools and colleges, and also possibly during village meetings at HEC hotspots, can be organised to train people on such safety measures.
- Tools for such safety measures may be elaborated.

3.3.5 MEASURES TO STRENGTHEN CROSS-SECTOR AND INTER-AGENCY COOPERATION FOR HEC MITIGATION

Cross-sectoral cooperation for HEC mitigation entails that multiple stakeholders from different sectors and domains be engaged, at national, state, landscape and district/forest division-levels. Key stakeholders for HEC mitigation may include State Forest Department, and other line departments, viz., Agriculture, Revenue, Animal Husbandry, Police, Public Works, Health and Family Welfare, Education, Electricity Boards; private sector (tea or coffee plantations), and agencies viz., Railways, National Highway Authority of India, as well as wildlife conservation and development NGOs, farmers' cooperatives and agricultural research institutions are relevant when dealing with conflict and conflict mitigation

Following measures are envisaged:

- State-level Coordination Committees (SLCC), landscape-level multi-stakeholder fora, and District-level Coordination Committees (DLCC), may be used to strengthen inter-agency coordination required for HEC, and district specific operational mechanism may be developed to address specific needs for HEC mitigation.

- Safety audits may be conducted each year, if feasible, to ensure that all members of the community act responsibly in case of HEC, and to facilitate inter-agency cooperation.
- Maintaining information and data on HEC cases with reference to the developments in the area that may have bearing on conflict cases, may be used for discussions in the DLCC.

3.3.6 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT ON HEC MITIGATION

To ensure effective and sustainable HEC mitigation measures, it is essential that field experiences, learnings, field-evidence and conceptual advances are not only

shared across key stakeholders and landscapes, but such knowledge is also documented to be utilised for future strategies and plans on HEC mitigation.

- National HWC Mitigation Forum, Landscape-level multi-stakeholder forum, and appropriate Working Groups may be used to share field experiences, learnings, evidence and conceptual advances, within the forest department, across stakeholders, and across landscapes.
- Measures may be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances on HEC mitigation, to inform the future strategies and plans on HEC mitigation.

4. DEPLOYING MEASURES TO PREVENT HUMAN–ELEPHANT CONFLICTS

4.1 DIFFERENTIAL MITIGATION APPROACH FOR DIFFERENT HEC LOCATION SCENARIOS

HEC can be effectively addressed by understanding the type of conflict, the site of occurrence, and its overall impact on humans and Elephants.

4.2 IDENTIFICATION OF HEC HOTSPOTS

“HWC Hotspots” are areas with actual or predicted repeated occurrence of HWC incidents resulting in crop-loss, livestock death, human death and injury, wildlife death and injury over temporal and spatial scales. It can be static (repeated in the same place or time) or dynamic (shift in space and time over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

Identifying conflict hotspots that could also provide a direction towards the drivers of conflict, is critical to provide site-specific solutions to mitigate human–Elephant conflict. Conflict hotspots of HEC can be mapped through geo-spatial assessments, by using both primary data and secondary data including time-series data. The hotspots can be identified and mapped as follows:

- **Incident hotspot:** Frequency of occurrence of incidences over past specific years such as previous five or ten years, mapped over the target area. The data include number of incident of injury and death, attack/ killing of domestic animals.

- **Vulnerability Hotspot:** Cumulative index by overlaying past incidents, vulnerability of local community and potential risk of the area.

The following assessment are envisaged:

- Database to be created by involving frontline SFD staff, researchers, research institutions, veterinary professionals and others for the identification and assessment of the hotspot.
- Predictive modelling based on the field data and Geographic Information System (GIS) analysis, may be carried out by trained personnel.

4.3 EFFECTIVE USE OF EARLY WARNING AND RAPID RESPONSE SYSTEM AT HEC HOTSPOTS

Since it is inevitable to prevent the wildlife and humans from using the same space in many situations, early warning systems and rapid response teams are important for timely action to prevent the conflicts and to reduce the impacts due to such incidents. However, with Elephants, some conflict situations require high intensity interventions.

A system of “Early Warning and Rapid Response (EWRR)” should be established and used to enhance the overall efficiency of mitigation efforts in the field. EWRR is a set of tools, processes and personnel competencies needed for the timely and meaningful generation and dissemination of alert information to individuals, communities and establishments at risk, for optimal preparedness and response and at the appropriate time to reduce the likelihood of injury, death or crop damage.

EWRR would structurally include an HWC Mitigation Hub/ Control Room, and a system of three-tiered response teams, viz, Division-level Rapid Response teams (Division RRT), range-level Rapid Response Teams (Range RRT) and village/ward level Primary Response Teams of local community (Community PRT). The following steps should be taken up under the EWRR system, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity development of HWC Mitigation response Teams*¹¹.

The system of early warning and rapid response can be used for detecting early conflict case with Elephants and for ensuring appropriate response in cases of HEC.

4.4 MONITOR AND DOCUMENT 'POTENTIAL ELEPHANTS-IN-CONFLICT' IN THE LANDSCAPE

Potential Elephant-in-conflict is/are individuals/ herds that are likely to enter in a HEC situation, owing to their movement pattern/ other behaviour.

Monitoring of potential Elephants-in-conflict in the forest-agriculture interface area can be carried out, as a preparedness and prevention measure, to ensure that their movement in the human-dominated landscape does not lead to an emergency situation. Following are some examples of such monitoring methods:

- Monitoring the movement of potential Elephants/ herds-in-conflict in the landscape, by recording direct observations, indirect evidence such as hoof prints and dung (to generate presence-absence data), and foraging signs in crop fields. Interviewing local villagers can reveal Elephant presence and movement patterns.
- Spatial and temporal movements, and behaviour of straying individuals from known Elephant herds monitored using camera traps and radio collars.
- Updates on the status of Elephants in potential conflict areas, especially on migration/ movement patterns, collected.
- SFDs may develop an identification database of identified individual and known herds of Elephants, their movement pattern within human-dominated landscapes, and the conflict that is thereby generated; this will help identify aggressive and individual Elephants with high potential for conflict

4.5 AN INTEGRATED APPROACH TO MANAGING POTENTIAL ELEPHANTS-IN-CONFLICT

There are three key elements in most HEC situations: the Elephant, humans (settlement) and the attractant for the Elephant (such a palatable crop). Sometimes removal of one of these elements in the conflict is required to resolve an intractable situation.

- Addressing high conflict Elephant/s: Male Elephants in particular are prone to higher levels of conflict and some of them become habituated to humans and the different methods they use to protect crop. The following measures are envisaged:
 - SFDs may develop an identification database of identified individual and known herds of Elephants, their movement pattern within human-dominated landscapes, and the conflict that is thereby generated; this will help identify aggressive and individual Elephants with high potential for conflict. SFDs should identify the high conflict individual/s from this database.
 - SFDs should test aversion conditioning to train habituated males who have the ability to breach barriers to avoid human use areas through radio collaring of such males so that systematic intervention is possible.
 - Necessary capture, translocation (if required) to be carried out as per the Guidelines and OP with related monitoring protocols. Translocation is one of the tools available for addressing high conflict individual or even pocketed populations. Animals which are captured may be rehabilitated in a suitable habitat or to be brought into captivity depending upon the situation.
- Addressing settlements inside the forest in HEC hotspots: When settlements inside the forests face very severe HEC and also have other problems based on the remoteness of their location, they may be willing to be resettled outside the forest in order to avoid HEC and to have access to a better livelihood and living conditions. In such situations the SFDs should facilitate voluntary resettlement, as per the protocols of the Government of India.
- Addressing the attractant for Elephants:
 - Identification of non-palatable crops by the farmers / agriculture department with due consideration to their socio-economic-cultural aspects

11 Supplementary frameworks to the HWC-NAP <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

- The low economic return from non-palatable crop may be addressed by facilitating assured pricing mechanism, value addition and marketing linkages.

4.6 MANAGING DISPERSING ELEPHANTS

Elephants which have strayed out of the forest and have been driven back to their natural habitat and also Elephants which colonise new areas, pose a very significant challenge to the managers. The following measures may be envisaged:

- Such Elephants should be monitored based on individual identification and tracking through radio-telemetry.
- Population-habitat viability analysis should be conducted for long-term scientific population management and HEC mitigation.
- Evaluation of the outcome of past dispersals is necessary to determine the effectiveness of the mitigation measures.
- Ensure regular monitoring and review by the Chief Wild Life Warden of the situation in all potential HEC conflict hotspots.

4.7 JUDICIOUS USE OF BARRIERS, TAKING A LANDSCAPE APPROACH

Barriers are primarily used to regulate the movement of Elephants, and poorly designed barrier can have adverse impact on conservation. Barriers are not fool-proof, so there may be breaches and occasionally some Elephant may be able to overcome them and enter human use areas.

Following principal types of barriers are currently used to prevent Elephant entering human-dominated areas:

- Elephant Proof Trench (EPT)
- Solar powered electric fences
- Rubble walls
- Other types – railway girders / tracks, steel channels / ropes / bars etc

When planning and establishing barriers, following to be considered

- Adopting a landscape approach during planning and execution so as not to disrupt natural movement of the Elephants in the landscape. This may be applicable to the following situations

- Construction of barriers around forest areas to keep Elephants inside the forest. Such barriers are not advisable around small forest blocks (few sq. km in size) because such forests cannot provide all the space and food requirements and confines the Elephant population, compromising their long-term genetic viability. It may be moderately useful around large forest blocks but extremely difficult to completely encircle forest blocks.

- Barriers constructed across the landscape between two states / districts / countries. It is rather impossible to create effective barriers at landscape-level ensuring movement of the Elephants across ecological landscapes and not be confined to administrative units.

- Barriers constructed around the settlement to be protected such as village / enclave. This would be most effective for protection of crops but it can be used only in specific situations wherever there is a compact area but not so around large enclaves.

- Creation of site-specific quality barriers using a participatory approach from designing monitoring and maintenance by systematic engagement of communities is essential.

- Barrier should only be used at the interface between human use areas and forests.

- Barriers with sharp spikes that have potential to injure Elephants, wildlife, livestock and humans should be avoided.

- When barriers are to be developed, a map should be prepared showing location of Elephant groups, seasonal migration patterns of Elephants and locations of Elephant corridors including location of proposed Elephant barriers.

- Barriers may be created only if the boundary is “hard” (clear and sharp demarcation between forest and human landscape), fairly straight without much convolution and not broken by roads, river or large stream for making them more effective.

4.8 JUDICIOUS USE OF OTHER EXCLUSIONARY MEASURES, TAKING A HARMONIOUS-COEXISTENCE APPROACH

Beating of drums or tin can, kerosene torch (mashal), swinging fireball and shouting are the most common repellent measures, but their effectiveness is low in most situations. The following measures may be envisaged:

- Innovative local repellent techniques like honey-bee boxes, chilly ropes etc may be piloted, and customised to enhance their effectiveness, while ensuring their wildlife-friendliness.
- New repellent methods may also include sound of bees and carnivores, use of drones etc besides deterrents like trip / sensor-based alarm system.
- Community-based institutions may be engaged by the SFDs together with wildlife experts / organisations, in motivating, training and hand-holding the community in use of exclusionary measures.

4.9 SUPPORT LOCAL POPULATION IN CROP-GUARDING METHODS

Guarding crops at night from any safe structure is one of the most effective early warning and deterrent method. Crop-guarding involves deterring Elephants by chasing and driving them using noise (i.e., shouting, beating drums or tins or using firecrackers/torches). Guarding crops at night is suitable in low-conflict areas. The following measures may be envisaged:

- Developing Community-based-conflict-management (CBCM) measures, especially in North Eastern Region, as a means of empowering the community to share the responsibility of HEC mitigation with the Forest Department through JFMC / EDC / Gram Sabha considering their vital stake and for eliciting more rapid response.
- Community PRTs and farmer groups may be engaged to ensure that besides preventive measures, traditional crop-guarding methods are encouraged, with the involvement of the local community/farmers.
- Awareness-building and training should be carried out on the proper usage of firecrackers and fire torches such that do not harm the Elephants, nor become fire hazards and on various aspects of the crop-guarding techniques.

- Early warning bulk SMS Alerts along with pulsating warning lights on towers, that warns of Elephant presence in the area may be developed.
- Farmers can be supported in developing effective and sustainable crop-guarding practices by various incentive mechanisms and subsidised funding under district-level government schemes such as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS).
- A compendium on good practices on crop guarding techniques may be developed for use by the local community.

4.10 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, ADOPTING A ONE HEALTH ¹² APPROACH

The response teams and other stakeholders, at HWC hotspots, are vulnerable to a variety of Zoonotic disease that can be transmitted from different animals, apart from the risk that exists for disease transmission domestic animals and wildlife; and between human-domestic animals:

- Veterinary capacities and infrastructure may be upgraded, to facilitate disease monitoring in Elephant populations (e.g., for anthrax, rinderpest, foot-and-mouth disease), both from an Elephant conservation point of view, and from zoonotic diseases spreading to livestock and human populations.
- To reduce biotic pressure on forests and prevent the spread of zoonotic diseases, it is encouraged to keep high yielding cattle and stall-feed them
- A well formulated Wildlife Health Management and Disease Surveillance Plan may be developed at every division/Protected Area (PA).
- All personnel involved with capture operations may be trained, vaccinated and equipped.
- The basic approach should be to integrate the concept of 'One Health', which links human and animal health in a shared environment, into all the operations and HEC mitigation measures in the field.

¹² One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HEC

Emergency or Crisis situations can be defined as situations that are sudden, unexpected, have the potential to be serious/are serious in nature and therefore require immediate intervention in time and space, from concerned stakeholders, to minimise loss of lives and assets. The response to such emergencies involves prompt handling of situations, ensuring reduced vulnerabilities of humans and Elephants.

An indicative list of the potential emergency situations on a priority basis is as follows:

- i. A human is killed/injured
- ii. Elephant/abandoned calves are injured and need rescue
- iii. Property is damaged
- iv. Elephant has entered human use areas (agriculture field or settlement areas)
- v. Livestock is injured/ dead
- vi. Elephant death due to retaliatory action by humans / train collision
- vii. Crop damage
- viii. Sighting of Elephant in the vicinity of agricultural land or settlement

Key response procedures should be established, and actions promptly implemented/ undertaken for addressing emergency situations. Detailed step-by-step guidance should be developed as “Operating Procedures for Addressing Emergency Response Situations”

The key emergency response procedures may be elaborated, and should include the following:

5.1 PREPAREDNESS MEASURES – BEFORE AN EMERGENCY SITUATION ARISES

5.1.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

A strong institutional mechanism is required, to respond to emergency situation arising due to HEC. This starts with detection of incident, communication to Control Room and information dissemination to the officials and staff in the command-and-control hierarchy, including forest and civil administration, for initiation of appropriate response actions. The divisional forest office coordinates action by rushing RRTs to the incident site. The field support

operations to be structured around the following key operational stages, for synchronisation of activities to meet the emergency:

- Monitoring and situational awareness.
- Mitigation Hubs/Control Room/helplines to receive and disseminate information.
- RRT/ PRT personnel, veterinary team, drug and equipment, mobility and communication to address the emergency situation, effectively and efficiently.

5.1.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Procedures may be laid down in each forest division/district, in line with these guidelines, and in line with the institutional framework suggested under the HWC-NAP, to ensure timely coordination amongst the various response teams from forest department and other agencies, under the DLCC consisting of District Magistrate/District Collector; Police, Fire Services, Animal Husbandry Department, Health Department, SDRF, NDRF, Paramilitary Forces, etc and local community, especially local Panchayat leaders and village Community PRTs.

5.1.3 PREPAREDNESS OF RESPONSE TEAMS

- Operating Procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (Community PRTs, RRTs) are established and facilitated in their capacity development through trainings and other measures, including trainings on occupational health and safety.
- Operating Procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of effective zoonotic diseases and pandemic prevention, management and control.

5.2 MEASURES DURING AN EMERGENCY SITUATION

5.2.1 IDENTIFICATION OF THE ELEPHANT-IN-CONFLICT

Identification of individual or group of Elephants-in-conflict to be characterised into casual (opportunistic) or repeated

(obligatory) crop foraging individuals/groups, which may result from Elephants with their natural movement adjoining the periphery of the forest, or Elephants which exclusively move within the crop lands due to the attractions, resulting in their localisation. The following steps may be taken for identifying the Elephant that causes conflict:

- The movement area of the Elephant in conflict may be demarcated or mapped.
- Follow the track marks and other distinct signs to confirm and track the presence and absence of Elephants.
- Investigate all conflict-related incidents within the region.
- Deploy a number of cameras at strategic locations depending on their predictable movement.
- Investigate the existing camera trap database if available and identify the individual based on the distinct morphological identification features.

5.2.2 OTHER KEY RESPONSE ACTIONS DURING AN EMERGENCY

- Operating Procedures may be laid down to receive, channelise and disseminate information at the onset of any emergency, from site of the incident, to related forest officials, HWC Mitigation Hub and further information dissemination, to requisition related response action at the emergency site.
- Specifications may be detailed for mobilisation, activation and deployment of response teams on ground to respond to the emergency situation.
- Adequate arrangements may be made to provide first aid to the person facing a health emergency condition, and then his/her quick transfer to the nearest available

equipped hospital should be facilitated. It is also critical to ensure occupational safety and health of the forest department personnel before, during and after any response operation.

- During an HEC situation, it is very essential to maintain public order and tranquillity through effective crowd management. SOPs indicating the specific roles and responsibilities of the forest department officials, District Magistrate/administration, police department, fire department, emergency services (NDRF, SDRF, paramilitary forces), health department, animal husbandry department, relief/revenue Department; first responders, specialised responders and other volunteers in crowd management should be laid down clearly, and these should be agreed to by all the stakeholders.
- The role of the media, before, during and after HEC situations should be discussed to ensure they participate effectively in crowd management and other mitigation measures.

5.3 MEASURES AFTER AN EMERGENCY SITUATION

- Operating Procedures may be laid down for reporting and process documentation of the response operation, including detailed on step-wise response actions taken and challenges faced, further Insights into the conflict and its future management, key follow up actions that need to be taken, if any, to resolve the issue (incident), management of animal if a capture was required, and assessment of the need to monitor the location for a few days to discourage any retaliatory actions

6. REDUCING THE IMPACT OF HEC ON HEALTH AND OVERALL WELL-BEING OF THE AFFECTED HUMANS

Humans living in Elephant range areas are familiar with its habits and behaviour and are accustomed to Elephant presence in the area. Although they are aware of how to react to the situations, many a times, things go beyond control and marginal farmers face losses due to HEC. Moreover, due to dispersal and colonisation of Elephants in new areas, people are not familiar with Elephants and are less tolerant of the damage caused in conflict.

A major response to HEC has been compensation for losses, but little evidence exists to support the claims that these schemes have an impact on people's attitude or the impact on the conservation of wildlife. Moral hazard, optimisation and leveraging of compensation schemes are a challenge.

Measures, which may encourage people to work towards harmonious co-existence, include participatory planning, awareness and communication for change the threat perceptions, integrating HEC mitigation into poverty alleviation programs and community-based natural resource management, and other site-appropriate stakeholder engagement measures, such as.

- Compensation for economic loss from damage to crops by Elephant activities, or personal injury or risk from Elephant encounters, is meant to increase community tolerance towards Elephants
- Insurance schemes require participants to pay a premium, for insurance against economic loss. This premium is determined based on the risk associated with HWC/HEC. The challenges of high premiums charged (due to high risk) have been addressed in some areas, by supplementing premiums with government or non-governmental funding support, community financing (e.g., through ecotourism), or better risk evaluation. Dialogue with insurance sector may be initiated for providing insurance cover for damages due to HEC. Modalities may vary for such programme from place to place based on assessment of risk by the Insurance companies. Feasibility may be explored at the state level
- Performance payments for community support for conservation may also be explored as an instrument, where the EDCs / VFCs can be provided funds for conservation-linked performance payments, and experiences and learnings can be shared back, for further refinement of these guidelines
- Conservation Easement may be a good instrument

for mitigation of conflict, which could be explored by incentivising conservation for mitigation of conflict and as an innovative mechanism, where farmers can be compensated for keeping these areas fallow for part of the year for wild animals or no/reduced gain from the farming income. Experiences and learnings can be shared back, for further refinement of these guidelines.

6.1 ADDRESSING THE SITUATION OF LOSS OF HUMAN LIFE

The dimensions of human death are many folds. It's not simple to fathom the loss of human life to the family of the victim. The primary assumption behind *ex gratia* is that the loss of life of any individual cannot be compensated. Therefore, any amount paid to the family of the victim is mere consolation or a kind of solatium.

The following measures may be implemented to effectively address the situation:

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs and the balance payment may be made at the earliest.
- The payments to the victim's family should be made into their bank accounts.
- In the HEC hotspots, a revolving fund may also be established, at the division-level, to ensure availability of funds for providing immediate relief to the victim/family.
- Possibility of setting up of foundations in the territorial divisions, for extending sustainable support to the victim, can also be explored. The minimum *ex gratia* payment may be kept in conformity with the Gajah (Elephant Task Force)¹³ recommendation by various states.

6.2 ADDRESSING THE HEALTH AND OVERALL WELL-BEING OF THE AFFECTED HUMANS

- In the case of injury, as a result of encounter with Elephant, the victim needs to be immediately hospitalised and *ex gratia* should be paid, as per the state government norms.
- Professional counselling through qualified psychiatrists/ health workers will be useful to check the effects of such traumatic incidents.

13 Rangarajan, Mahesh, Ajay Desai, R Sukumar, PS Easa, Vivek Menon, S Vincent, Suparna Ganguly, BK Talukdar, Brijendra Singh, Divya Mudappa, Sushant Chowdhary and AN Prasad. Gajah. Securing the Future for Elephants in India. The Report of the Elephant Task Force,

- The SFDs and other government agencies/ institutions may organise some counselling sessions for such victims and support them in coming out of this psychological impact.

6.3 ADDRESSING THE SITUATION OF PROPERTY DAMAGE

Ex gratia for property damage does not generally consider the cost of repairing and the costs of temporary fixes that are needed prior to repairs. The poor are affected more as their houses are of low value and damages do not consider the fact that the main costs is actually labour that the family provides in reconstruction and not the cost of materials themselves.

- Property insurance should be the ultimate goal. Awareness and adoption of options regarding property insurance should be given priority. However, till the system is fully established, present system of payment of compensation should be continued and enhanced by factoring in the hidden costs and losses. Compensation for damage to property (including buildings) should be in accordance with the state government rules, and may be made at the earliest.
- Mobile application-based system may be developed, to evaluate the loss of property and *ex gratia* paid to the property owner.
- Elephant may enter urban areas and semi-urban area close to the forest, which may create panic amongst residents. The following measures may provide relief and assistance to the community. SFDs may coordinate with the respective resident welfare associations for *ex gratia* payment in the event of loss of property and human injury

6.4 ADDRESSING THE SITUATION OF CROP DAMAGE AND LIVESTOCK INJURY/LOSS

The long-term impacts of assessment of crop compensation amount are complex. While payment of inadequate compensation to farmers will lead to resentment among humans, leading to adverse impact on wildlife conversation due to retaliatory killings. Payment of compensation is equally challenging as it might also lead to laxity in crop protection by the farmers, and inhibit possible innovations for crop guarding.

- Ministry of Agriculture and Farmers Welfare have included the crop loss by activities of wild animals under its flagship scheme *Pradhan Mantri Fasal Bima Yojana* (PMFBY), which can be used as an important HWC mitigation instrument. However, till the system is formally established in remote forest areas, the existing system of direct payment of compensation to farmers should be continued.

- The process of settling crop or property loss compensation should be transparent and simplified. Mobile apps may be used for collecting the information and processing of claims of farmers, after crop losses from Elephant activities, to ensure efficiency and transparency in the system. Experiences and success-story sharing across states can facilitate further improvements in the system.

- Farmers may be encouraged, facilitated through community-based institutions, to explore solutions such as change in cropping pattern, use of non-palatable crops etc.
- Collaborative efforts can be made to promote market-based arrangements for alternate crops, wherever feasible. Community Primary Response Teams (PRTs) may be engaged to facilitate this process in their respective villages/ areas of operations.
- Site-specific studies may be conducted to find out appropriate crops that are non-palatable to Elephants, in collaboration with agricultural institutions.
- Ensure sufficient delegation at field-level for deciding and disbursing *ex gratia* compensation for its effective use for addressing possible trauma due to HEC
- Livestock loss or injury, as a result of encounter with Elephant, are not common. However, cattle tethered near or in Elephant movement paths may be at risk. SFDs may coordinate with Animal Husbandry Department for providing livestock insurance coverage in HWC hotspots. To reduce conflict and risk of loss of livestock inside the forest areas, it is encouraged to stall feed the livestock in HWC hotspots.

6.5 ADDRESSING THE SITUATION OF LOST LIVELIHOOD OPPORTUNITIES

- HEC may deprive humans of their jobs, or reduce their ability to raise income, and thus diminish their capacity to make a living. *Ex gratia* and compensation in an important coping mechanism, but specific measures may be required to ensure long-term sustainability of livelihoods at the HWC hotspots. Following measures may be planned and implemented, with cross-sector cooperation:
 - Systematic assessments of the extent and scale of lost livelihood opportunities and other indirect impacts, due to HEC, may be conducted
 - Development of skills for alternative non-land/non-farming-based income generation opportunities
 - Creation of self-help groups (SHG) for facilitating small businesses that adopt alternative non-land / non-farming based livelihoods.

7. REDUCING THE IMPACT OF HEC ON THE HEALTH AND WELL-BEING OF ELEPHANTS

Indian laws take a very strong stand on animal welfare. There are enough provisions in national and state laws to avoid and prevent cruelty and harm to animals.

- All the care should be taken to address the issues of Animal Welfare and Animal Rights as enshrined in the Constitution (Article 48A and 51A(g)), and as per the statutory provisions made under the Indian Penal Code (Sections 428 and 429), Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), Motor Vehicles Act 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.

7.1 ADDRESSING THE HEALTH OF ELEPHANTS DURING CAPTURE AND POST-CAPTURE OPERATIONS

Capturing of Elephants can be for different purposes, for example capture can be for radio-collaring to be used for research purposes, or for early warning and rapid response treatment of injured Elephants or rescuing abandoned calves, or removal of Elephant from conflict space for the purpose of translocation or bringing it into captivity.

Operating procedure (OP), providing step-by-step procedure and approach for tracking and capturing Elephant/s as a mitigation measure, may be developed. Separate Operating Procedures for radio-collaring, treatment and transport to be developed to ensure animal health and safety during such operations.

Post-capture management of Elephants includes knowing the position of the captured animal (captured through immobilisation), monitoring physiological parameters and transportation of the animal. Currently, most of the capture of Elephants is done through immobilisation.

- The first & foremost thing after immobilisation of the Elephant is to restrain it securely in a comfortable position to maintain airway.
- Following drug induction, the Elephant should be approached (from the rear) keeping safety in mind.
- Post capture health examination and monitoring of the immobilised Elephant is mandatory.
- The physiological parameters (temperature, respiration, pulse and colour of mucous membrane) need constant monitoring, as these are likely to be compromised during chemical capture.
- Any significant deviation in normal physiological parameters should be dealt with appropriately.

Health Examination post capture & Critical monitoring of the immobilised Elephant:

- Once the Elephant is properly positioned, the Veterinarian should examine its health status and monitor its vital signs (pulse, respiration rate, temperature, blood oxygen level etc). Accordingly, it may be decided whether the radio collaring or capture operation will continue or the animal needs to be revived due to some complication/health emergency and released.
- A checklist of parameters may be elaborated.

Transportation post capture:

- The animals should be transported in specially designed vehicles or large containers (for long distance) or on foot (for short distance).
- The vehicle should be designed considering the animal's weight, adequate ventilation options (containers), sound non-slippery floor, provision of drainage to facilitate disposal of waste etc.
- The animal needs to be appropriately secured in the vehicle and necessary transport considerations should be in place during transit.
- Alternatively, the animal can be hoisted on the vehicle using slings/ropes/belts taking due anatomical and physiological considerations strictly under veterinary supervision and using a skilled crane operator.
- Stops en-route should be pre-planned and identified well in advance aimed at achieving the shortest journey time possible and ensuring safety and wellbeing of the animal.
- The animal needs to be regularly monitored for signs of discomfort or stress during the entire journey period by veterinary professional, and the Elephant maintained in a sedated state.
- Koonkies, if available, should be used in moving / pushing the animal into the vehicle/ container.

Food and water during transportation

- It is better to avoid provisioning of feed and water during overnight transport and efforts should be made to reach the destination (release site/ Elephant camp/ designated facility) as early as possible taking due care of vehicle speed and halting destinations.
- Water should be made available to the animal during transportation especially on hot journeys exceeding 6

hr. Water should also be at hand to control possible hyperthermia of recumbent animals.

7.2 RELEASE ESSENTIALS

- Relocated Elephants should be fitted with GPS-based collars to monitor their movement with the option of recapturing them in case they again come into conflict.
- The site of release should be at sufficient distance (typically of the order of 200-300 km or greater) such that it is unlikely that the Elephant would be familiar with the new site and attempt to go back to the place of capture.
- “Soft release” options can also be experimented with; this would involve keeping the animal in a stockade for some limited time period at the proposed site of release before letting it free.
- The animals should be monitored for any transport injuries or any other health-related issues following release.
- The release sites should have proper off-loading facility and release should be done with the least possible stress on the Elephants.
- Following release in native habitats, it is necessary to monitor the behaviour of the animal/s and its interaction with the other herbivores
- The animal should be monitored post-release, for injuries, wounds, ill-health and disease such as nervous, locomotive or digestive disturbance by team of veterinary professionals, biologist and manager during the initial period.
- There is also a need for long-term monitoring of the health of the released individual/ population.
- In some instances, the best option or the only option may be to retain the captured Elephant or Elephants in captivity, especially if the animal has killed people or the risks of release into the wild are too high. If Elephants are retained in captivity, it is essential to consider their proper welfare and utilisation.
- In case destined for captivity, the animal should be held in fenced enclosure/ Kraal. This would provide chances for animal to recover from anaesthetics, in getting acclimatised to their surroundings at new destination and provide opportunities for intensive monitoring and veterinary management.

- In case the Elephant is required to be kept in captivity, the space provided to the Elephant should be as per the guidelines issued by the Project Elephant division, MoEFCC.

- Proper sanitation and hygiene should be maintained to avoid chances of infection
- Adequate balanced food and water should be made available along with mineral and vitamins supplements as per the health status of the Elephant.
- Health Screening: A general health screening once a week should be done and a thorough health examination should be done at least once in a month. Bi-monthly foot dip, foot care and nail trimming should be carried out to prevent foot problems. In case of suspicion of some serious health condition, samples should be collected and sent to institutes like Indian Veterinary Research Institute (IVRI) etc. for more advanced investigations.

7.3 REHABILITATION OF THE CAPTURED ELEPHANT

- In the case of Elephant brought into captivity temporarily for treatment, their release post treatment should take into consideration their past record in conflict.
- Elephants that have a record of high conflict cannot be released back as they are more habituated to humans when compared to the Elephants not causing serious conflict, which can be released back with adequate monitoring.
- States having wild Elephant population may envisage at least one Elephant rescue and rehabilitation centre and should follow CZA guidelines for their management.
- Chief Wildlife Wardens should ensure that Rescue and Rehabilitation Centres for Elephants as well as housing facilities for captive Elephants are maintained properly to avoid complaints about cruelty/ ill treatment of Elephants.

7.4 MANAGING ORPHANED/STRAY ELEPHANT CALVES-IN-CONFLICT

An Elephant calf, in the wild, is orphaned due to several reasons and special care is required to handle it, as follows

- The rescued calf should be raised under guidance of a veterinarian by an experienced senior/dedicated mahout. It should be handled only by one mahout with full precautions about hand hygiene and hygiene of the room/enclosure in which the calf is housed.
- For young calves below the age of 1 year, the constant presence (24 x 7) of the mahout is critical as stress of separation can very adversely affect its survival. If there are adult female Elephants in the facility and one of them is tolerant to the calf, then the calf should be raised in its presence as the female will act as a foster mother.
- The calves should not be exposed to humans as they have a weak immunity and may contract the diseases quickly.

7.5 RADIO COLLARING OR TAGGING (RFID-MICROCHIP) AN ELEPHANT

Elephants may be radio collared before release. Radio collars are important for HEC mitigation with the objective of understanding ranging behaviour and other information.

- Ranging behaviour studies will help to better understand how and why certain Elephants come into conflict and help the development of customised conflict mitigation measures including RRT deployment, aversion conditioning, barriers, community awareness about preventive behaviours/actions, etc. These studies will also help to ascertain the effectiveness of mitigation methods and also in understanding how Elephants respond to these methods and how these methods impact Elephants.
- Radio collaring may also facilitate enhancing the effectiveness and efficiency of the response teams, as using real-time location information from satellite collars can help RRTs to intervene early and stop Elephants from coming into conflict.
- It is useful to radio collar an injured Elephant to monitor it systematically for medical intervention over an extended period of time.
- Radio Frequency Identification Device (RFID) may be used for tagging captured wild Elephants brought to captivity

7.6 HEALTH AND WELL-BEING OF PRIVATE AND TEMPLE ELEPHANTS

- There are several instances of private Elephants and temple Elephants not being managed properly and going out of control, often during processions, due to loud music, crackers and presence of large crowd etc. The captive Elephants need to be managed as under:
- As far as possible, Elephants may be kept away from the congested places and large crowds. Assembly of Elephants in temples or other public places should not be permitted unless the organisers have taken adequate measures to deal with any emergency. It should be ensured that the Elephants, particularly bulls, participating in public functions are manned only by trained and experienced mahouts.
- A dossier should be maintained of all Elephants including their behaviour in the crowd and public functions. Operating Procedures (OPs) should be drafted for tackling such situations. Rapid response teams should be formed by the Forest Department in big cities to tackle such situations.
- Captive Elephant welfare committees should be constituted at State and District levels to ensure welfare and humane treatment of captive Elephants, particularly in private custody.
- Chief Wildlife Wardens should periodically monitor ownership certificates/ microchips of Elephants.
- Guidelines for care and management of captive Elephants issued by the MoEF No. 9-5/2003 PE dated 8.1.2008 for transportation, housing, care, feeding, work etc should be strictly followed including maintenance of necessary records and registers.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN INSTITUTIONAL AND POLICY FRAMEWORK ON HEC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place, to document the feedback coming from implementation of them.

- The feedback from use of these guidelines may, therefore, be consolidated, to form the basis for

fine-tuning these mitigation measures, and also understanding capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further reviewing the capacity development strategies, HWC-MAPs, HWC-SAPs, and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, consisting of representatives from Government agencies, SFDs, research institutions, civil society institutions, International organisations and independent wildlife policy experts as members of the core team. The experts were a mix of scientists, wildlife managers, policy experts, and capacity development experts.

- A common understanding was developed on the overall purpose, scope, approach and methodology.¹⁴ The experts implemented different roles in the drafting and editing process, viz. Coordinating Lead Authors, Lead Authors, Contributing Authors, and Review Editors. The Author Group worked on developing these Guidelines during July 2019- August 2021, while consulting a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the existing documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into this new document. A National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII), *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ), and independent wildlife and

policy experts, was formed for overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate planning and implementation of pilot testing, consultations and final editing of draft guidelines and HWC-NAP. Detailed terms of reference of each of this category was provided and meetings and workshops of the author groups were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India, to test and receive feedback on the feasibility and acceptability of the recommendations expressed in the Guidelines, using structured process and tools. Based on the feedback received during fortnightly meetings and one to one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEFCC in December 2022, consisting of officials from MoEFCC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years

from 2023 onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- Detailed mechanism, templates and guidance used for collating information and feedback on the use of these guidelines may be developed.

14 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Guidelines for Human-Gaur Conflict Mitigation

Taking a Harmonious-Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Human-Gaur Conflict Mitigation

Taking a Harmonious-Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development
CWLW	Chief Wildlife Warden
CZA	Central Zoo Authority
DLCC	District-Level Coordination Committee
EDC	Eco-development Committee
EIA	Environmental impact assessment
EWRR	Early Warning and Rapid Response
GIS	Geographical information system
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoI	Government of India
HGC	Human–Gaur conflict
HOFF	Head of Forest Force (in a state)
HWC	Human–wildlife conflict
HWC-MAP	Human–Wildlife Conflict Management Action Plan
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan
HWC-SAP	State-Level HWC Mitigation Strategy and Action Plan
IFS	Indian Forest Service
LAMP	Large Area Multipurpose Society
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MoEF&CC	Ministry of Environment, Forest and Climate Change
M&E	Monitoring and Evaluation
NDRF	National Disaster Response Force
NGO	Non-governmental organisation
NTG	National Technical Group
NTFP	Non-timber forest produce
NWAP	National Wildlife Action Plan of India
OPs	Operating procedures
OHS	Occupational health and safety
PA	Protected area
PCCF	Principal Chief Conservator of Forest
PPE	Personal protective equipment
PHVA	Population–habitat viability analysis
PMFBY	Pradhan Mantri Fasal Bima Yojana
PRT	Primary Response Team
RRT	Rapid Response Team
SDRF	State Disaster Response Force
SFD	State forest department
SLCC	State-Level Coordination Committee
VFC	Village Forest Committee
WII	Wildlife Institute of India
WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	6
1.1 The overall context	6
1.2 Purpose and scope	6
1.3 Approach	6
1.4 Legal and policy framework for implementing the guidelines	6
1.5 Institutional mechanism for implementing of these guidelines	6
2. Context and Situation	7
3. Addressing the drivers and pressures of HGC	8
3.1 Overall measures	8
3.2 Monitoring and managing habitat-related drivers and pressures	8
3.3 Removal of invasive plant species in and around HGC hotspots	9
3.4 Reduce livelihood dependence of humans on forests	9
3.5 Scientific management of population at interface areas or conflict hotspots	9
3.6 Strengthening the role of key stakeholders and cross-sector and inter-agency cooperation for HGC mitigation	10
3.7 Community awareness and communication measures to reduce the risk of accidental encounters and retaliation	10
3.8 Sustainable garbage management and safe sanitation around Gaur habitats	10
3.9 Systematic research and monitoring addressing HGC	11
3.10 Facilitating capacity development measures to develop the required competencies for addressing HGC in the most effective and efficient manner	12
3.11 Measures to strengthen the system of knowledge management related to HGC mitigation	12
4. Deploying Measures to Prevent Human-Gaur Conflicts	13
4.1 Differential mitigation approaches for different HGC location scenarios	13
4.2 Identifying hotspots of HGC	13
4.3 Effective use of the Early Warning and Rapid Response system at each hotspot	13
4.4 Monitor and document 'potential Gaurs-in-conflict' in the landscape	14
4.5 Managing potential Gaurs-in-conflict	14
4.6 Judicious use of barriers, taking a landscape approach	14
4.7 Support local population with crop-guarding methods	15
4.8 Addressing zoonotic and other emerging diseases, taking a One Health approach	15
5. Addressing the Emergency Situations Arising due to HGC	16
5.1 Establishment of emergency response mechanism	16
5.2 Intra and Inter agency coordination and cooperation	16
5.3 Preparedness of response teams	16
5.4 Action at the onset of emergency or specific situations	17
6. Reducing the Impact of HGC on Health and Well-being of Humans	18
6.1 Addressing the situation of loss of human life	18
6.2 Addressing the health and overall well-being of affected humans	18
6.3 Addressing the situation of loss of livestock	18
6.4 Addressing the situation of loss of property	19
6.5 Addressing the situation of crop damage	19
7. Reducing the Impact of HGC on the Health and Well-being of Gaurs	20
7.1 Arrangements prior to capture operation, to ensure the Health and Safety of Gaurs	20
7.2 Addressing health of Gaurs during immobilisation, capture, transport and release	20
7.3 Managing orphaned/stray Gaur calves-in-conflict	21
8. Use of Learnings from the Guidelines to Further Strengthen Institutional and Policy Framework on HGC Mitigation in India	22
9. Process of Development and Pilot Testing of These Guidelines and Consultation Process	22
10. Monitoring and Evaluation of Guidelines	22
Annexe I	23
National Technical Group (NTG)	23
Working Group on Pilot Implementation of Guidelines and HWC-NAP	23
Author Group for drafting the guidelines	23

1. About the Guidelines

1.1 THE OVERALL CONTEXT

- These guidelines on Human-Gaur Conflict Mitigation get the overall context from the Wild Life (Protection) Act, 1972, National Wildlife Action Plan (2017-31)¹, the Advisory to Deal with Human-Wildlife Conflicts (MoEF&CC 2021) and National Human-Wildlife Conflict Mitigation Strategy and Action Plan of India (2021-26) (HWC-NAP)². HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good practices issued by various state forest departments (SFDs) and builds on them to bring about a more holistic approach to HGC mitigation.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human-Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human-Wildlife Conflict Situations: Taking a One Health Approach.
- In addition to the HGC mitigation-guidelines, the following guidelines are to provide guidance on other selected species: Guidelines for Mitigating Human -Elephant, -Leopard, -Snake, -Crocodile, -Rhesus Macaque, -Wild Pig, -Bear, -Blue Bull and -Blackbuck Conflict.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders, on what constitutes effective and efficient mitigation of HGC in India, leading to co-existence, and to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and Gaurs.
- The guidelines provide advice on mitigation measures to address HGC in the long term, as well as facilitate in development, assessment, customisation and evaluation of site-specific HGC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HGC mitigation measures at national, state and forest division level.
- In general, the guidelines apply to all stakeholders relevant to HGC mitigation and are not limited to state forest departments.
- The Guidelines will be able to bring in more effectiveness and efficiency, when fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and State-level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence³ approach to ensure that both humans and Gaur are protected from the negative impacts of HGC.
- The guidelines address the issue of HGC, taking a holistic approach. The holistic approach of the guidelines entails not only addressing the emergency situations arising due to immediate conflict situations but also addressing the drivers and pressures that lead to HGC; guidance on establishing and managing prevention methods; and reducing the impact of conflict both on humans and Gaurs.
- The development of these guidelines and their intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HWC mitigation measures with key sectors and stakeholders at national, state and local levels.
- The guidelines facilitate a landscape approach while formulating solutions for mitigating HGC to ensure sustainable solutions, as unless comprehensive and integrated HGC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementers through provision of the *Implementer's Toolkit* to provide operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines are to be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wildlife (Protection) Act 1972.
- The following legislations are considered directly relevant for conservation when dealing with HGC:
 - Wild Life (Protection) Act 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6), 39(1)(a) of the WLPA 1972 are especially relevant while dealing with the HGC.
- Supplementary framework to HWC-NAP on Legislative Framework for HWC Mitigation in India⁴ may be referred for more details on the specific legal provisions for HWC mitigation.
- Other important legislations that facilitate conservation when dealing with HGC, include Environment Protection Act 1986, Indian Penal Code 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; Disaster Management Act, 2005 etc.

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTING THESE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed for implementing these guidelines.

1 MoEFCC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impact of human-wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans where both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

4 Supplementary frameworks to the HWC-NAP <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2. Context and Situation

The Gaur (*Bos gaurus gaurus*), family Bovidae, is one of the largest wild ungulates of Asian forests. The Gaur is the tallest living bovid and one of the four heaviest land mammals. Gaurs are important modifiers of the physical structure of habitats and of ecosystem structure and function because they can trigger trophic cascades, increase spatial heterogeneity, accelerate successional processes and influence nutrient cycling and primary productivity. As ecosystem landscapers, Gaurs play an important role in the moist and dry deciduous forests of India, in ensuring provisioning of ecosystem services and in maintaining biodiversity.

Gaurs are social animals, diurnal in their activity; however, human disturbance forces them to become more nocturnal. They have typical local and seasonal movements that are influenced by the availability of resources. They are obligatory drinkers and require to drink water at least once every day. The frequency may increase during the peak of summer. Gaurs are both grazers and browsers - feeding on a large variety of plant species.

The Gaur population in India co-occurs with Elephants throughout its present distributional range, except in much of the Central Indian Highlands, where Elephants have become extinct. Presently the Gaur population is distributed in more or less isolated pockets, largely corresponding to the major mountain systems of the Western Ghats, the Central Indian Highlands and the North-eastern Himalaya, including the hills south of the Brahmaputra.

In recent years, increasing numbers of HGC cases have been reported from north-eastern India (especially in northern West Bengal) and central and southern India. Incidences of aggression towards humans and frequent Gaur encounters cause fear and panic in humans' minds. Widespread and frequent instances of Gaur damage to crop fields, kitchen/backyard gardens and property and injury to humans (death of humans in a few extreme cases) have been reported. Thus, the intensity of Human-Gaur conflict (HGC) is increasing in the Gaur distributional range.

HGC refers to the negative interaction between humans and Gaurs, leading to adverse impacts such as injury or loss of human lives, crops, livestock and other properties, or even the emotional well-being of humans, and equally negative impacts on Gaurs or their habitats.

The key drivers of HGC include the human population increase, greater local dependency on the biomass in forest-fringe areas, land use changes, linear infrastructure, mining, urban development and habitat loss, fragmentation and degradation.

Gaur population increase at the forest interfaces and human-dominated areas; forest fires leading to habitat degradation; inadequate alternative livelihood options for local communities in and around forest areas; and insufficient awareness of gaur behaviour and garbage management among humans exert further pressures resulting in HGC.

HGC is expressed in the form of crop foraging by gaurs, rare livestock encounters and human death/injury in the forest fringe villages, human habitations and tea estates. Gaurs are shy animals. Hence, large-scale damage from their foraging of crops in the fringe areas has not been reported. In recent years, owing to shrinkage and fragmentation of forests, the conflict has, however, increased. There are instances of death of a few Gaurs every year, especially near smaller and fragmented habitats.

HGC mitigation so far has been largely focused on the use of barriers, short-distance drives and *ex gratia* payments for damages. While these efforts have helped in mitigating HGC to some extent, a holistic approach to HGC mitigation is required to ensure effectiveness and sustainability in the mitigation efforts.

3. Addressing the Drivers and Pressures of HGC

3.1 OVERALL MEASURES

Effective and sustainable mitigation of HGC involves effective problem analysis, to identify drivers and pressures of conflict resulting in appropriate selection of mitigation measures.

- An assessment of long-term outcomes and implications of all mitigation measures is needed to identify effective and wildlife-friendly mitigation measures to address HGC. This will facilitate customisation and adaptation of the mitigation measures and combining mitigation measures to achieve the best possible impacts in the field. Cross-sectoral cooperation is critical for addressing drivers of HGC through improved land use planning and other measures and to customise the mitigation measures.

HWC-NAP recommends a holistic approach to HWC mitigation by considering and addressing the thematic triangle of drivers-prevention-damage mitigation. These guidelines are prepared in line with the recommended holistic approach to bridge the current gap.

3.2 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

Monitoring the drivers and pressures will play a crucial role in understanding and mitigating HGC. The following habitat-related assessment and actions may help in planning appropriate mitigation measures:

- Map existing drivers and pressures of conflict such as linear infrastructure, mining, encroachments, human settlements within forests and use by local communities.
- Identify connectivity/corridors, improve their long-term viability and maintain ecological contiguity.
- Linear infrastructure projects (roads, rail, canals etc.) have the potential to fragment the habitat and obstruct daily and seasonal movements of Gaurs. These can be technologically retrofitted with underpasses/overpasses to allow safe crossing points for Gaurs, and suitable speed limits on roads/railways may be determined. Linear development projects to follow measures recommended in Wildlife Institute of India (WII) linear infrastructure guidelines.

- Clearly demarcate all forest boundaries to enable the patrolling teams in efficient detection of any encroachments.
- Map land tenures, identify key stakeholders and initiate consultations with them to develop community reserves and to secure relevant corridors.
- Map the foraging, ranging and distribution of Gaurs in human-dominated landscapes.
- Irrigation canals with the potential to trap Gaurs entering them may be fitted with barriers.
- Infrastructure development projects (urban development, mining, hydro-electric projects, etc.) may follow environment impact assessment (EIA) guidelines and rules and specifically identify the extent and magnitude of HWC/HGC that may arise or get escalated as a result of the proposed activities and may build in measures to prevent and/or mitigate the HWC impacts, if any.
- Prepare, implement and periodically update long-term perspective plans, such as State-Level HWC Mitigation Strategy and Action Plans (HWC-SAP) and Division-Level HWC Management Action Plans (HWC-MAP). A common framework for developing these plans is provided in the supplementary frameworks to the HWC-NAP⁵.
- Develop synergies and facilitate integrated land-use planning for effective implementation of planned measures, through the State-Level Coordination Committees (SLCC), Multi-stakeholder Fora at the state-level, Joint Working Groups with key departments and agencies at the landscape level, and the District-level Coordination Committees (DLCC).
- Develop innovative fire protection strategies and equipment, using remote sensing technology, etc. and engage the local community, especially the community-level Primary Response Teams (Community PRTs).
- Facilitate long-term studies to understand the effectiveness and wildlife-friendliness of these measures in addressing the drivers in the landscapes.

5 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3.3 REMOVAL OF INVASIVE PLANT SPECIES IN AND AROUND HGC HOTSPOTS

There may be suppression and reduction of indigenous plants (forage for Gaurs) due to the presence of invasive alien species in the area resulting in decreased habitat quality, leading to increased movements of Gaurs out of the forested landscapes in search of better forage, subsequently leading to increased HGC in human-dominated landscapes. The following measures may be implemented:

- Map invasive species cover and abundance within the landscape and herbivore use of the landscape and accordingly implement habitat management plans.
- Explore the use of remote sensing data for mapping and managing invasive species.
- Prioritise sites for intervention on the basis of invasive species abundance, areas critical for Gaurs (and other herbivores) and conflict hotspots to ensure efficient mitigation, given the severity and urgency of the problem and the challenges involved in containing and eliminating invasive species over large landscapes.

3.4 REDUCE LIVELIHOOD DEPENDENCE OF HUMANS ON FORESTS

Accidental encounters of humans with Gaurs inside the forest areas can be prevented to a large extent by reducing the dependence of humans on forests. The following indicative measures may be implemented.

- Facilitate management interventions for better livelihood opportunities for forest-dwelling communities through community participatory approaches, including various eco-development measures and livelihood improvement programmes.
- Facilitate reduction of dependency of fringe forest communities on forests (cattle grazing, fodder collection, fuelwood collection, NTFP collection, right-of-way, etc.) by participatory forest management.
- Facilitate in addressing livelihood needs of communities by skill development, poverty alleviation and alternate income generation schemes of the Government.
- Facilitate in improving animal husbandry practices (e.g., by promoting stall-feeding of cattle or incentivising the rearing of improved livestock breeds)

- Facilitate cooperation between SFDs and other line departments and agencies, to integrate HGC mitigation planning at District level. This can be supported through measures including, but not limited to, dovetailing HWC mitigation measures with schemes relevant to community development.

3.5 SCIENTIFIC MANAGEMENT OF GAUR POPULATION AT INTERFACE AREAS OR CONFLICT HOTSPOTS

A local overabundance⁶ of Gaurs could be due to various factors, including habitat loss, degradation and fragmentation of natural habitats, or an increase in the Gaur population. Some Gaur populations in forest-fringe areas have also become habituated to humans. Therefore, there needs to be a clear understanding of the spatio-temporal distribution, foraging and ranging patterns and the use of human-dominated landscapes, for scientific management of Gaur population in such areas.

The following measures are envisaged:

- SFDs may work towards building both internal capacity and collaborations with research institutes and researchers to achieve the high standards of data collection and analysis needed for population assessment and its scientific management.
- SFDs may adopt a robust population monitoring protocol and implement it using trained field staff or/and in collaboration with research institutes or local universities/colleges.
- The impacts of dispersing Gaur populations that have colonised new areas on the safety of the local communities and the Gaurs themselves may be assessed.
- SFDs may work towards clearing ground vegetation and carry out tree thinning, in those forest patches where Gaur populations have become resident outside the forest, are taking shelter in small insular forest patches and are moving in a set pattern to forage on crops. This will prevent opportunistic and accidental sudden encounters between Gaurs and humans.
- Measures to understand the population dynamics of Gaurs in tea estates where they have become resident and record changes in their behavioural attributes.

⁶ 'Local overabundance' refers to the occurrence, in a habitat, of an excessive number of individuals of a species beyond the normal population density due to a variety of factors.

3.6 STRENGTHENING THE ROLE OF KEY STAKEHOLDERS AND CROSS-SECTOR AND INTER-AGENCY COOPERATION FOR HGC MITIGATION

Cross-sectoral cooperation for HGC mitigation entails engaging multiple stakeholders from different sectors and domains, at national, state, landscape and district/forest division levels. Key stakeholders for HGC mitigation may include the SFD and other line departments, viz., Agriculture, Revenue, Animal Husbandry, Police, Public Works, Health and Family Welfare and Education departments; Public Health Institutions; Electricity Boards; the private sector (tea or coffee plantations); agencies, viz., the Railways and the National Highway Authority of India; and wildlife conservation and development NGOs, farmers' cooperatives and agricultural research institutions.

Long-term engagement with key stakeholders and sectors may be institutionalised on a sustained basis by adopting the following measures:

- State-level Coordination Committees (SLCC), Landscape-level Multi-stakeholder Fora, and District-level Coordination Committees (DLCC) may be used to strengthen the inter-agency coordination required for HGC, and district-specific operational mechanisms may be used to address specific needs of HGC mitigation.
- Maintaining information and data of HGC cases and the developments in the area that may have a bearing on the conflict. This may include agricultural practices, NTFP collection and cultural, religious or other traditional practices inside forests.
- Facilitate support to the community-level (village/ward) Primary Response Teams (PRT) as the entry point for all community engagement work and form a dedicated cadre of community-level response teams, especially including youth and women at HGC hotspots.
- The EDCs/ VFCs formed by the SFDs in villages abutting the forest area at HGC hotspots are to be made functional and their sustainability ensured.
- Plan and implement training programmes and other capacity development measures with school and college students, with women's self-help groups (SHGs), Village Forest Committees (VFCs), Eco-development Committees (EDCs), Large Area Multipurpose Society (LAMPs), forest user groups, etc.
- Local communities may be supported in enhancing their understanding of Gaur behaviour, and how to conduct themselves in Gaur habitats, as well as addressing situations when Gaurs are actively using their property/crop fields.

- Develop appropriate awareness material in local languages (posters, handouts, short films, street plays, etc) delete with support from local community outreach organisations and institutions.
- Ensure participation from stakeholders to integrate traditional and local knowledge and experiences into development of division-level HWC-MAPs

3.7 COMMUNITY AWARENESS AND COMMUNICATION MEASURES TO REDUCE THE RISK OF ACCIDENTAL ENCOUNTERS AND RETALIATION

- To facilitate effective engagement of local communities and various stakeholders in mitigation of HGC, and to prevent accidental encounters of humans and Gaurs, it is extremely important to plan and implement awareness and sensitisation measures, taking a participatory approach.
- Appropriate community awareness and communication measures may be implemented at HGC hotspots, and their impacts may be assessed periodically to ensure that the awareness and communication measures are locally customised.

3.8 SUSTAINABLE GARBAGE MANAGEMENT AND SAFE SANITATION AROUND GAUR HABITATS

The risk associated with generation of waste is greatest in the villages and towns abutting the forests, where, if sustainable waste management is not practiced, food waste attracts wild animals. The local communities, living in forest-fringe villages are vulnerable to accidental encounters with Gaurs/other wild animals that range in the forest periphery, attracted not only to such food waste but also crops and water sources, especially during the lean season.

The following are indicative measures to address the situation:

- Ensure sustainable and ecologically sound waste and garbage disposal by town municipalities and village panchayats bordering Gaur habitats.
- Undertake periodic inspection of the forest perimeter near villages/towns to ensure that poor disposal of waste and garbage is detected early and brought to the notice of relevant local authorities. Volunteers can be engaged for this.
- 'Aversion conditioning' measures may be implemented in areas where Gaurs have started foraging inside the villages and towns in search of forage and have become accustomed to feeding on garbage.

- SFDs may also coordinate with municipalities/ panchayats regarding garbage management and explore the possibility of getting toilets built under the *Swachh Bharat Mission* to prevent accidental encounters of Gaurs and humans at HGC hotspots.

3.9 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HGC

HGC mitigation is a challenging issue, especially when adequate data on the Gaur population density, demography, social and ranging behaviour and ecology are not available. Currently the data used for assessing the impact of HGC are limited to the number of *ex gratia* payments made, number of humans killed or injured and the number of Gaurs killed. There is a clear need to have a more holistic understanding of HGC and its implications for humans and Gaurs, through the following indicative measures:

- Facilitate development of a knowledge base of critical information such as habitat usage, habitat connectivity, corridors, preferred or suitable habitat, home range, behaviour, attractions along the habitat and the movement paths.
- Data on indirect costs of HGC (e.g., farmers abandoning agriculture due to HGC or deteriorating human well-being, including stress, fear and restrictions on normal human daily activities) and other socio-economic impacts of HGC on families and communities are to be collected.
- Record and analyse data on long-term adverse impacts of HGC on Gaurs (in terms of stress, reduction in reproductive fitness, loss of genetic diversity, etc.).
- SFDs may involve research institutions, non-governmental organisations (NGOs) and experts to carry out data- and result-oriented research on the HGC status and existing mitigation measures, besides undertaking in-house research.
- Standardised criteria for assessing the effectiveness and wildlife-friendliness of mitigation measures may be developed and used.
- The following areas may be given higher priority for research and monitoring at HGC hotspots. The results from such studies are to be consolidated at the national level to support further review of these guidelines and strengthen the HGC mitigation measures:
 - Gaur responses to land-use changes (mining, linear infrastructure) inside the forest
 - Gaur responses to changing cropping patterns and land-use changes outside the forest
 - Understanding what factors influence crop foraging behaviour in Gaurs
 - Status of Gaur populations, along with demographic parameters
 - Impact of local overabundance on habitat and population and impact on other species
 - Effectiveness and wildlife-friendliness of HGC mitigation measures
 - Impacts of different mitigation measures on Gaurs (changes in resource use, health and HGC)
 - Effect of habitat fragmentation and linear infrastructure on the HGC patterns
 - Mapping ecosystem services provided by Gaurs and the trade-off with economic loss caused due to injuries or deaths of humans or livestock from encounters with Gaurs
 - Assessment of the socio-economic status and perception of communities on forest fringes, and the social and knowledge capitals to sustain HGC pressures, and related factors enabling co-management and co-existence
 - Assessment of Gaurs in human-dominated areas (agriculture fields, plantations, semi-urban areas, etc.), and economics of HGC, by understanding and engaging different stakeholders, including corporates and other departments/agencies
 - Assessment of the status of Gaurs in semi-urban centres, the associated perception of local communities and effective instruments to address the perception and enable co-existence
 - Modelling the HGC dynamics and risk probability in the context of forest cover change, human population growth, development projects, disasters (including fire, flood, landslides etc.) and climate change impacts
 - Developing and using protocols for identifying and monitoring potential and actual Gaurs-in-conflict across the landscape
 - Development of knowledge-management and decision-support systems at state-, division- and local levels, as real-time information flows, and integrating them with the national database
 - Resource use pattern of Gaurs in the forest-village interface areas studied and correlates or factors that facilitate Gaur persistence in the forest-fringes identified
 - Movement ecology of Gaurs (through the use of radio collars and telemetry) and predicting the conflict probability within and between landscapes.

3.10 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HGC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

The following measures are envisaged for facilitating capacity development of key institutions and experts:

- SFDs are to ensure that all their response team personnel and, if possible, those of other line departments and agencies are brought under a systematic approach to capacity development, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*⁷.
- The response teams, other field personnel and local community members may be provided regular training and made aware about zoonotic and other emerging diseases, and occupational health and safety, through a One Health approach⁸.
- Regular and systematic specialised training programmes on critical operations such as rescues, captures and translocations may be conducted jointly with other key relevant departments in the form of mock-drills and simulation training.
- Advanced training programmes on animal welfare issues may be conducted for all the personnel of the RRTs.
- The competencies of the members of the RRTs may be reviewed regularly, and their training curriculum is to be fine-tuned and updated regularly, by the state forest training institutions.

3.11 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT RELATED TO HGC MITIGATION

- To take effective and sustainable HGC mitigation measures, it is essential that field experiences, learnings, field-evidence and conceptual advances be shared across key stakeholders and landscapes, and that such knowledge be documented to be utilised for future strategies and plans related to HGC mitigation.
- Landscape-level multi-stakeholder fora, and appropriate Working Groups may be used to share field experiences and learnings within the Forest Department, across stakeholders and across landscapes.
- Measures are to be taken to systematically document field experiences, learnings, field-evidence and conceptual advances related to HGC mitigation to inform the future strategies and plans related to HGC mitigation.

⁷ *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams* is available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

⁸ The One Health concept is based on the understanding that human, animal and environmental health are closely interconnected and interdependent. One Health is a collaborative, multisectoral and transdisciplinary approach- working at the local, regional, national and global levels with the goal of achieving optimal health outcomes, recognising the interconnection between humans, animals, plants and their shared environment.

4. Deploying Measures to Prevent Human-Gaur Conflicts

4.1 DIFFERENTIAL MITIGATION APPROACHES FOR DIFFERENT HGC LOCATION SCENARIOS

HGC can be effectively addressed by understanding the type of conflict, the site of occurrence and the overall impact on humans and Gaurs. HGC can be divided into three broad categories, each of which requires different mitigation methods, with some overlap:

- For HGC occurring inside the forest, measures such as habitat management, minimising forest use, and capacity development can be implemented.
- When HGC occurs at the interface, early warning and rapid response system including deployment of RRTs and PRTs, capacity development, and barriers and deterrents are to be implemented.
- When HGC occurs in human-dominated landscapes, then apart from early warning and rapid response, capacity development, barriers and deterrents, focus can be on capture and translocation of Gaurs-in-conflict, and their safe release and rehabilitation.

4.2 IDENTIFYING HOTSPOTS OF HGC

'HWC hotspots' are areas with actual or predicted repeated occurrence of HWC incidents resulting in crop-loss, livestock death, human death and injury and wildlife death and injury over temporal and spatial scales. It can be static (repeated in the same place or time) or dynamic (shift in space and time over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

Identifying HGC hotspots, which may provide a direction towards the drivers of the conflict, is critical to provide site-specific solutions to mitigate conflict. Conflict hotspots of HGC can be mapped through geo-spatial assessments using both primary data and secondary data, including time-series data. The hotspots may be identified and mapped as follows:

- **Incident hotspot:** Frequency of occurrence of incidences over past five or ten years, mapped over the target area. The data include the numbers of incidents of injury, death and loss of crop.

- **Vulnerability hotspot:** Cumulative index obtained by overlaying past incidents, the vulnerability of the local community and the potential risk of the area.

The following assessments are envisaged:

- Database may be created by involving frontline SFD personnel, researchers, research institutions, veterinary professionals and others for identifying and assessing the hotspot.
- Predictive modelling based on the field data and Geographic Information System (GIS) analysis may be carried out by trained personnel.

4.3 EFFECTIVE USE OF THE EARLY WARNING AND RAPID RESPONSE SYSTEM AT EACH HOTSPOT

An Early Warning and Rapid Response (EWRR) system may be established at HWC hotspots in India to enhance the preparedness and overall efficiency of mitigation efforts in the field. EWRR is a set of tools, processes and personnel competencies needed for the timely and meaningful generation and dissemination of conflict information to individuals, communities and establishments at risk for optimal preparedness and response at the appropriate time to reduce the likelihood of injury, death or crop damage.

The EWRR may include an HWC Mitigation Hub/ Control Room and a system of three-tiered response teams, viz, Forest Division-level Rapid Response teams (Division RRT), Forest Range-level Rapid Response Teams (Range RRT) and community (village/ ward)- level Primary Response Teams (PRTs). The EWRR system may be established in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity development of HWC Mitigation response Teams*⁹.

The EWRR system may be used for detecting early cases of HGC related emergencies and for ensuring appropriate emergency response.

9 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

4.4 MONITOR AND DOCUMENT 'POTENTIAL GAURS-IN-CONFLICT' IN THE LANDSCAPE

Potential Gaur-in-conflict are individuals/herds that are likely to enter a HGC situation owing to their movement pattern/other behaviour.

Monitoring of potential Gaur-in-conflict in the forest-agriculture interface area may be carried out, as a preparedness and prevention measure, to ensure that their movement in the human-dominated landscape does not lead to an emergency situation. The following are some examples of such monitoring methods:

- Monitoring the movements of potential Gaur-herds-in-conflict in the landscape, by recording direct observations, indirect evidence such as hoof prints and dung (to generate presence-absence data) and foraging signs in crop fields. Interviewing local villagers can reveal Gaur presence and movement patterns.
- Spatial and temporal movements and the behaviour of straying individuals from known Gaur herds monitored using camera traps and radio collars.
- Gathering updated information on the status of Gaur in potential conflict areas, especially their migration/movement patterns.
- SFDs may develop an identification database of identified Gaur and known herds, their movement patterns within human-dominated landscapes and the conflict that is generated by the movements. This will help identify individual Gaur with high potential for conflict.

4.5 MANAGING POTENTIAL GAURS-IN- CONFLICT

When male Gaur enter an agricultural landscape or settlement, they may get disoriented, may show an aggressive behaviour and may thus be prone to entering into conflict situation with humans. Gaur, once habituated to crop fields, keep returning, even when driven back to the forest. Often, Gaur taking refuge in small patches of forest near villages, agricultural landscapes, tea gardens and private/SFD plantations become resident there, showing no inclination to move back to the forest. The foraging, ranging and seasonal movement patterns of such Gaur require specific attention.

The following measures may be implemented to manage Gaur-in-conflict, in the long term:

- Given the fact that Gaur become habituated to humans and also have the ability to breach barriers, it is usually difficult to contain them. It would be useful to test different 'aversion techniques' to habituate herds to avoid human-dominated landscapes.

- Identifying agricultural crops to which Gaur are attracted, the cropping seasonality and the Gaur's intensity and frequency of foraging on these crops. Planting non-palatable crops as a buffer between forests and villages could be attempted, according to the site-specific conditions.
- Translocation of a few individual Gaur that are highly aggressive and resident in human-dominated areas may be attempted when their rehabilitation in suitable habitats is a viable option.
- Gaur that are translocated to suitable habitats in the forest may be monitored for their subsequent movements and their likelihood of returning to agriculture landscapes gauged.
- When Gaur are sighted within an agricultural landscape for the first time, they need to be driven back to the forests and monitored, before they get habituated to the new landscape and to humans. Population-habitat viability analysis (PHVA), coupled with requirements of meta-population management, may provide information for dealing with such first-time crop-foraging Gaur.
- Ensure regular monitoring and reviews of the situation by the CWLW in all potential HGC hotspots.

4.6 JUDICIOUS USE OF BARRIERS, TAKING A LANDSCAPE APPROACH

Barriers are primarily used to prevent entry or regulate the movements of Gaur. A poorly designed barrier is likely to have low effectiveness and can possibly negatively affect the health of Gaur. No barrier is fool-proof; there will be breaches and occasionally some Gaur may be able to overcome them and enter human-use areas. Therefore, the following measures are envisaged:

- Adopting a landscape approach during planning and execution, so as not to disrupt the natural movements of Gaur within their landscape.
- Creation of site-specific quality barriers using a participatory approach, from designing and monitoring to maintenance, by systematic engagement with communities.
- Barriers may only be used at the interfaces between human-use areas and forests.
- Well-maintained barriers serve to keep Gaur away from agricultural lands. However, the same also divert the population to adjoining unprotected lands and villages, thus transferring the problem elsewhere, which again needs to be mitigated. Therefore, a landscape-level planning may be done before installing barriers.
- Fences can be erected on forest boundaries, or on cropland boundaries, or around individual farms or groups of farms.

The following is an indicative list of barriers that may be tested and further fine-tuned at HGC hotspots:

- The most common fences that farmers construct to keep wild animals away are random rubble-wall stone fencing, apart from live hedges. Gaurs are known to run over and breach live fences and dead brushwood fences. Hence, any fence to keep them out should be firm and well entrenched.
- Chain-link or woven-wire fences are known to be effective, if raised on a toe wall with a good foundation.
- A solar fence¹⁰ with an oscillating current also acts as a psychological barrier, and with time, this may act as an aversion conditioning for Gaurs and may result in reduced attempts from Gaurs to cross the fence. Farmers raising crops along forest boundaries can erect power fences to protect their crops.
- The design and deployment of barriers may be planned, as far as possible, taking Gaur behaviour and landscape-use, including access to critical water sources or natural foraging areas, into consideration.

4.7 SUPPORT LOCAL POPULATION WITH CROP-GUARDING METHODS

Guarding crops at night from any safe structure is one of the most effective early warning and deterrent methods. Crop-guarding involves deterring Gaurs by using noise (i.e., shouting, beating drums or tins). Guarding crops at night is suitable in low-conflict areas. The following measures may be envisaged:

- Community PRTs and farmer groups may be engaged to ensure that besides preventive measures, traditional crop-guarding methods are encouraged, with the involvement of the local community/farmers.
- Awareness-building measures should be facilitated for the local community on the negative impacts of the use of firecrackers, fire torches and other similar methods.
- Farmers may be supported in developing effective and sustainable crop protection methods, including crop guarding, through central and state development programmes and schemes. The possibility of including such work under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) can be explored.
- A compendium on good practices on crop protection methods may be developed.

4.8 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH

The response teams and other stakeholders at HWC hotspots are vulnerable to a variety of zoonotic diseases that can be transmitted from different animals, apart from the risk that exists for disease transmission between domestic animals and wildlife; and between humans and domestic animals.

- Veterinary capacities and infrastructure may be upgraded to facilitate disease monitoring in Gaur populations, both from a Gaur conservation point of view and to prevent zoonotic diseases from spreading to livestock and human populations.
- To reduce the biotic pressure on forests and prevent the spread of zoonotic diseases, it is recommended that high-yielding cattle be stall-fed.
- A well-formulated Wildlife Health Management and Disease Surveillance Plan may be developed at every division or PA.
- All personnel involved in capture operations may be trained, vaccinated and equipped.
- The basic approach may be to integrate the concept of One Health¹¹, which links human and animal health in a shared environment into all the operations and HGC mitigation measures in the field.

¹⁰ A solar fence draws energy from an electric energiser or solar energiser and passes a low current at an oscillating high voltage through strands. On contact, the fence produces a non-lethal shock and acts as a psychological barrier for wild animals.

¹¹ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. Addressing the Emergency Situations Arising due to HGC

Emergency or crisis situations can be defined as situations that are sudden, unexpected, have the potential to be serious/are serious in nature and therefore require immediate intervention in time and space, from concerned stakeholders, to minimise loss of lives and assets.

The response to such emergencies involves prompt handling of situations, ensuring reduced vulnerabilities of humans and Gaurs.

An indicative list of the potential emergency situations is enumerated below:

- A Gaur has killed/injured a person.
- A Gaur has been injured or has died due to retaliatory actions by humans, or a Gaur has fallen into a well or deep ditch or has been trapped and needs to be rescued.
- A Gaur has entered a crowded lane in a village or town and is moving dangerously or attacking humans.
- A Gaur has entered the kitchen garden or backyard of a house in a village and is damaging property.
- A Gaur on a road has created panic among the local community and has halted traffic.
- A Gaur is occupying an agricultural field and is foraging on crops.

Key response procedures may be established and actions promptly implemented for addressing emergency situations.

A detailed emergency procedure may include the following steps:

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

A strong institutional mechanism is required to respond to emergency situations arising due to HGC. This starts with detection and dissemination of information for initiation of appropriate response actions.

The field support operations are to be structured around the following key operational stages for synchronisation of activities to meet the emergency:

- Monitoring and situational awareness
- Mitigation Hubs/Control Room/helplines receive and disseminate information.
- RRT/ PRT personnel, veterinary team, drug and equipment, mobility and communication to address the emergency situation, effectively and efficiently.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Operating procedures may be laid down in each forest division/district, in line with these guidelines, and in line with the institutional framework suggested under the HWC-NAP, to ensure timely coordination amongst the various response teams from the Forest Department and other agencies, under the DLCC, consisting of the District Magistrate/District Collector, Police, Fire Services, Agriculture Department, Rural Development and Panchayati Raj Department Animal Husbandry Department, Health Department, SDRF, NDRF, paramilitary forces, etc. and the local community, especially local panchayat leaders and community PRTs.

5.3 PREPAREDNESS OF RESPONSE TEAMS

- Operating procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (community PRTs, RRTs) are adequately established and facilitated in their capacity development through training programmes and other measures, including training sessions on occupational health and safety.
- Operating procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of effective zoonotic disease and pandemic prevention, management and control.

5.4 ACTION AT THE ONSET OF EMERGENCY OR SPECIFIC SITUATIONS

5.4.1 Identification of the Gaur-in-conflict

The Gaur-in-conflict is an individual that is involved in a case of HGC. It could be female or male, an adult, calf or juvenile. Adult females normally have the most influence on their herds. The adult male neither dominates nor leads the herd during crop foraging. The adult bulls are seen wandering alone, separated from the herd. Formation of bull groups in Gaur is opportunistic, during which two or more bull Gaurs meet and remain together, only for a few hours or a few days, foraging on crops. The extensive ranging of adult bulls within and between agricultural landscapes makes their monitoring very difficult.

The Chief Wildlife Warden (CWLW) of each state can permit the capture of a Gaur if she/he is satisfied that such an individual Gaur has become dangerous to human life or is so disabled or diseased beyond recovery. However, she/he may record the reasons for issuing such a permit, in writing, after being satisfied with the report of the field officer at the site, that the Gaur has been correctly identified and that there has not been an accidental encounter (opportunistic) between a Gaur and the affected human but rather the result of habituated and repeated (obligatory) incidents.

The following steps may be taken for identifying the Gaur-in-conflict:

- The conflict location may be cordoned off first.
- Trace the movements by tracking the Gaur trail, following tracks and signs of damage to crops during Gaur's foraging. A Gaur either returns to the forest or takes refuge in a small patch of forest.
- Investigate an area within 100 m of the incident location focusing on the animal trails and paths.
- Deploy two to four camera traps, if available, with white flashes and infrared flashes, with one/two of them in still mode and the other one/two in video mode.

- In the case of a Gaur encounter with humans, analyse the injuries caused by horns and trampling by hooves.
- Investigate the existing camera-trap database, if one is available, and identify the individual, based on the size and other morphometric or unique details.
- Investigate details of earlier incidents with the SFD staff and local communities for corroboration with the circumstantial evidence.

5.4.2 Other key response actions during and after an emergency

- Operating procedures may be laid down for step-wise key actions for all emergency situations, media engagement, crowd management, addressing health emergencies and post-response operations for managing the animal. This includes ensuring the animal's health and safety during the capture, transport, selection of the translocation site and monitoring after releasing the animal safely back in the wild.

6. Reducing the Impact of HGC on the Health and Well-being of Humans

Key manifestations of HGC are damage to crops or property (damage to fences, houses, etc.) or assets (livestock injury/death) or as encounters leading to human injury or death.

- A wide range of approaches could be envisaged that encourage local communities to live and prosper in Gaur habitats according to the principles of co-existence, co-management, participatory planning, risk assessment, strategies to change perceptions, poverty alleviation programmes, community-based natural resource management, and other forms of stakeholder engagement and processes.
- *Ex gratia* payments for economic loss from damage to crops by Gaur activities, or personal injury or risk from Gaur encounters, is meant to increase community tolerance towards Gaurs.
- Insurance schemes require participants to pay a premium for insurance against economic loss. This premium is determined on the basis of the risk associated with HWC/HGC. The challenges of the high premium charged (due to the high risk) have been addressed in some areas by supplementing the premiums with government or non-governmental funding support, community financing (e.g., through ecotourism) or better risk evaluation.
- A dialogue may be initiated with the insurance sector for providing insurance cover for damage due to HGC. The modalities of the programme may vary from place to place according to the assessment of the risk by the insurance companies. The feasibility of such modalities may be explored at the state level.

6.1 ADDRESSING THE SITUATION OF LOSS OF HUMAN LIFE

The dimensions of human death are manifold. It is not simple to fathom what the loss of human life means to the family of the victim. The primary assumption behind *ex gratia* payments is that the loss of the life of any individual cannot be compensated. The following measures may be implemented:

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family should be made in their bank accounts.
- In HGC hotspots, a revolving fund may also be established at the division-level to ensure that funds are available for providing immediate relief to the victim/family.

6.2 ADDRESSING THE HEALTH AND OVERALL WELL-BEING OF AFFECTED HUMANS

- In the case of injury resulting from an encounter with a Gaur, the victim needs to be hospitalised immediately and an *ex gratia* payment made, as per the state government norms.
- Professional counselling through qualified psychiatrists/health workers may be useful for the victims of such traumatic incidents.

6.3 ADDRESSING THE SITUATION OF LOSS OF LIVESTOCK

Livestock losses or injuries resulting from encounters with Gaurs are not common. However, cattle tethered near or in Gaur movement paths may be at risk.

- SFDs may coordinate with the Animal Husbandry Department for providing livestock insurance coverage in HWC hotspots.
- To reduce conflict and risk of loss of livestock inside forest areas, livestock may be stall-fed at HWC hotspots.

6.4 ADDRESSING THE SITUATION OF LOSS OF PROPERTY

- *Ex gratia* payment for damage to property (including buildings) from Gaur activities may be in accordance with the state government rules and may be paid at the earliest.
- A mobile application-based system may be used to evaluate the loss of property and *ex gratia* payment to the property owner.

Gaurs may enter urban areas and peri-urban areas close to forests, which may create panic amongst residents. The following measures may provide relief and assistance to the communities in urban and peri-urban areas.

- Raising awareness about the ecology and behaviour of the Gaur, to prevent accidental encounters.
- Installation of an early warning system using surveillance devices.
- Facilitating competency-development measures, on a regular basis, for community PRTs to ensure that there is an effective first response.
- Deployment of barriers and other deterrents.

- Maintaining sanitary conditions (including garbage management).
- SFDs may coordinate with the respective resident welfare associations for an *ex-gratia* payment in the event of loss of property and human injury.

6.5 ADDRESSING THE SITUATION OF CROP DAMAGE

Assessment of the amount of *ex gratia* payment to be made towards crop damage and its long-term effectiveness are complex issues. Payment of inadequate *ex gratia* may lead to resentment among humans, leading to adverse impacts on wildlife conservation due to retaliatory actions. Payment of *ex gratia* may also lead to laxity in crop protection and inhibit possible innovations in crop-guarding.

- The Ministry of Agriculture and Farmers Welfare has included crop loss caused by activities of wild animals under its flagship scheme *Pradhan Mantri Fasal Bima Yojana* (PMFBY), which may be used as an important HWC mitigation instrument.
- The process of providing *ex gratia* for crop or property loss should be transparent and simplified. Mobile apps may be used for collecting information and processing of claims farmers, after crop losses from

Gaur activities, to ensure that there is efficiency and transparency in the system. Experiences and success-story sharing across states can facilitate further improvements in the system.

- Farmers may be encouraged, facilitated through community-based institutions, to explore solutions such as changing cropping patterns and using non-palatable crops.
- Collaborative efforts can be made to promote market-based arrangements for alternate crops, wherever feasible. Community Primary Response Teams (PRTs) may be engaged to facilitate this process in their respective villages/areas of operations.
- Site-specific studies may be conducted to find out appropriate crops that are non-palatable to Gaurs, in collaboration with agricultural institutions.
- Appropriate protocols are to be developed for assessment of damage and providing relief.
- Ensure sufficient delegation at the field level for deciding and disbursing the *ex gratia* payment so that it is effectively used for addressing possible trauma due to HGC.

7. Reducing the Impact of HGC on the Health and Well-being of Gaur

All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Article 48A and 51A(g)) and as per the statutory provisions made under the Indian Penal Code (Sections 428 and 429), Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.

7.1 ARRANGEMENTS PRIOR TO CAPTURE OPERATIONS TO ENSURE THE HEALTH AND SAFETY OF GAURS

- The equipment required for a Gaur capture operation, including radio collars, transport vehicles and holding facilities/bomas¹² at the release site, may be checked from a checklist containing descriptions of the equipment, its field-worthiness, and maintenance, with cross-references to the maintenance manual.
- Protocols may be developed for the veterinary team for the pre- and post-capture, immobilisation, transportation and release procedures. A thorough check of the drugs (immobilisation and emergency) and accessories and functioning of the equipment may be carried out, according to the veterinary protocols.
- The training of the field staff for their role and responsibilities at the capture site and release site is the most important part of the operation. Training may be provided on locating and monitoring Gaur herds, capturing and darting, loading/unloading of immobilised Gaur, emergency management, transport, logistics/support at the unloading site and post-release monitoring. The darting team may be trained to dart a Gaur at different distances before the actual operation.
- It may be useful to carry out a mock drill, if possible, prior to the capture for each activity, including a dry run of the transport truck from the capture site to the release site, to assess the road/travel conditions, the suitability of the vehicle and the availability of halting points during the journey, in order to optimise the vehicular speed.

7.2 ADDRESSING THE HEALTH OF GAURS DURING IMMOBILISATION, CAPTURE, TRANSPORT AND RELEASE

- The tracking team should be familiar with the habitat and should be competent in locating the Gaur-in-conflict.
- The Gaur-in-conflict may be approached by the darting team on the back of an Elephant/vehicle for darting. If the Gaur is not visible or is at a distance, then the approach may be made on foot carefully. After the immobilisation there are a few procedures that may be followed to ensure the safety of the Gaur, as well as the health and safety of the field teams.
 - The monitoring team should be very alert during the immobilisation of the Gaur. This is because, after darting, during the drug's induction phase, the Gaur may move considerable distances. Therefore, the tracking team may follow and locate it and ensure that the darted Gaur is in clear sight of the team before it goes down into sternal recumbency.
 - Proper positioning of the Gaur's body may be ensured for the normal eructation of ruminal gases. Otherwise, bloat may result and can lead to further complications. Moreover, care should be taken to ensure that the regurgitated rumen contents flow out of the Gaur's mouth and are not aspirated back.
 - After the rescue, the Gaur may be brought into the holding structure/boma prior to transportation to the release site. This is to ensure that the Gaur has recovered from the effects of the capture operations.

After they capture, the following health examinations are required:

- Animal-body screening for any symptoms of external or internal injuries
- Monitoring of critical animal welfare parameters
- Recording of morphometric measurements
- Collection of biological samples for investigation of any possible disease

A checklist of parameters may be developed.

¹² 'Boma' refers to a mass capturing technique for wild animals traditionally used in Africa by constructing a temporary enclosure into which wild animals are driven through a funnel toward a crush. Curtains in the funnel are closed once the animals have entered the funnel. Then they move through the crush onto a ramp and into a transport truck.

- The tranquilised Gaur may be loaded onto the transport truck with the aid of a ramp. A little coaxing of the Gaur and pulling it with ropes is sufficient to load it into the truck. However, for some reluctant/resisting Gaurs, *kumki* Elephants are to be used to facilitate loading.
- Sometimes in emergency rescue cases, when a Gaur is in a swampy area or inside water, cranes may be used for lifting the animal, after verifying that the ropes and harness that carry the Gaur are strong enough to take the weight of the 600 to 1000 kg animal.
- The truck journey to the release site or to the rescue facility/transit facility may commence in the late evening, so as to avoid any human and vehicular disturbance. It may be timed to reach the release site/rescue facility during the early morning hours.
- The Gaur being transported may be constantly monitored throughout the journey by the accompanying veterinary team members.
- For unloading the captured animal from the truck at the release site, an earthen ramp may be constructed adjacent to the boma/holding enclosure.
- After an initial stabilisation, a fitness test may be conducted on the Gaur by the veterinary team before it is released.
- The team should be well prepared for all the situations that may arise during the transport and/or release of the animal.
- Post-release monitoring of the released Gaur may be conducted through the use of direct (e.g., through radio-tagging, radio-telemetry) or indirect (e.g., spoor, indirect signs, camera traps) methods, depending on the availability of equipment and trained personnel, to observe the animal and its status.
- Demographic, ecological, and behavioural studies of the released Gaur may be conducted to ensure long-term adaptation to the new habitat.

OPs providing step-by-step procedures for tracking and capturing Gaurs as a mitigation measure and post-capture operations may be developed.

7.3 MANAGING ORPHANED/ STRAYED GAUR CALVES-IN-CONFLICT

A Gaur calf in the wild is orphaned due to several reasons, and special care is required to handle it:

- The rescued calf may be raised under the guidance of a veterinarian by an experienced animal keeper from a zoo. It should be handled only by the animal keeper with full precautions about hand hygiene and the hygiene of the room/enclosure in which the calf is housed.
- For young calves below the age of one year, it is necessary that bonding be developed between the animal keeper and calf so that there is a stress-free environment and the calf is free from the initial trauma of separation.
- A calf should not be exposed to humans as its immunity is weak and it may contract infections and diseases quickly.

8. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework Related to HGC Mitigation in India

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place, to document the feedback coming from implementing them.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for fine-

tuning these mitigation measures and understanding the capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further review of the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. Process of Development, Pilot Testing of These Guidelines and Consultation Process

- A dedicated framework of experts (Annexe I) was formed, consisting of representatives from government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts as members of the core team. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.

- A common understanding was developed on the overall purpose, scope, approach and methodology¹³. The experts played different roles in the drafting and editing process, viz., Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the existing documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into this new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and *Deutsche Gesellschaft für Internationale*

Zusammenarbeit (GIZ) and independent wildlife and policy experts was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided, and meetings and workshops of the author groups were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India, for testing and for receiving feedback on the feasibility and acceptability of the recommendations expressed in the guidelines using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. Monitoring and Evaluation of Guidelines

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of these guidelines is planned

to take place every five years from 2023 onwards. However, a mid-term review process may be desirable in 2024. In the long-term, review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- The mechanism, templates and guidance for collating information and feedback on the use of these guidelines may be developed.

13 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

Annexe I

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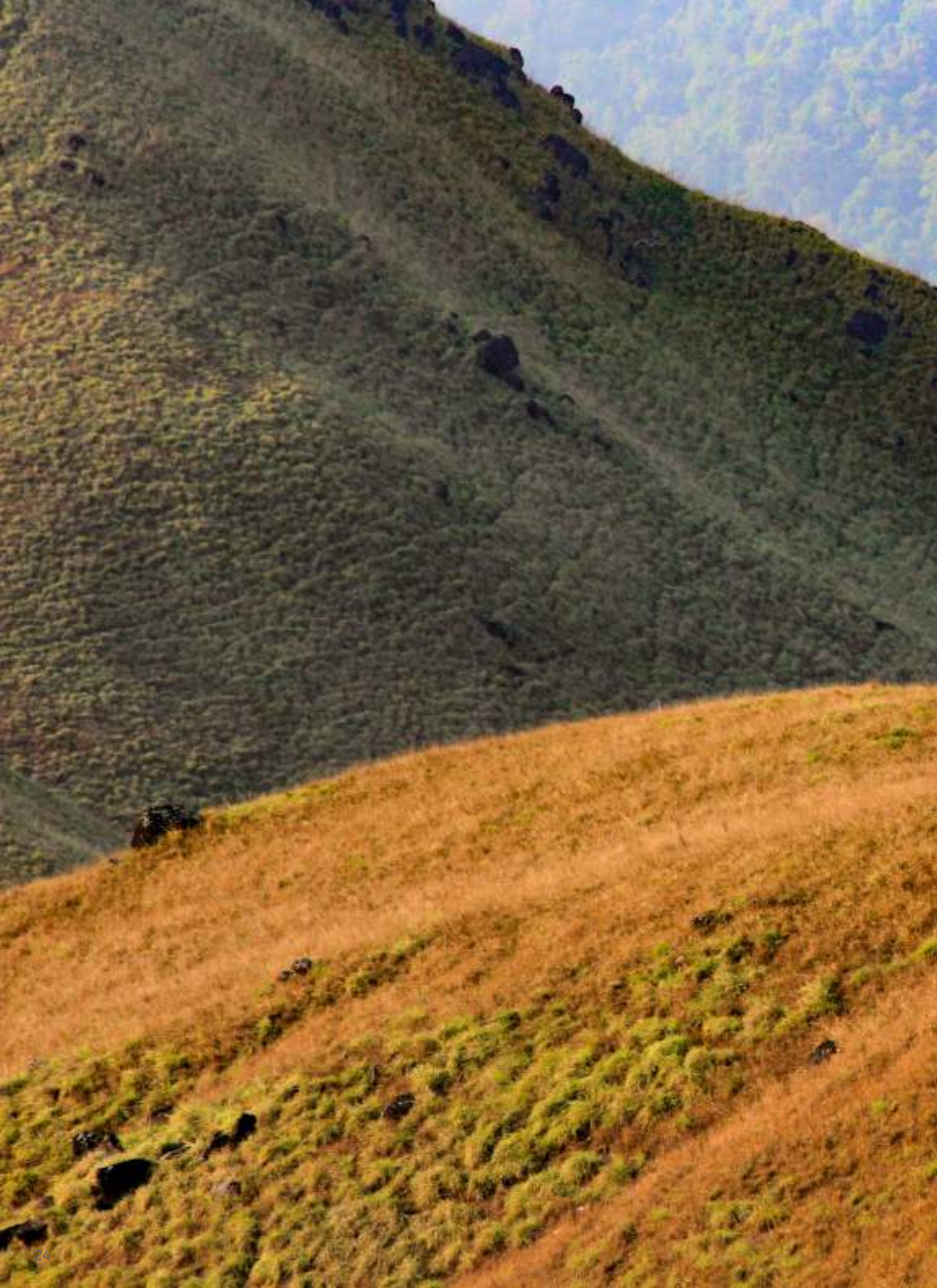




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Guidelines for Human-Leopard Conflict Mitigation

Taking a Harmonious-Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



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Government of India

Guidelines for Human–Leopard Conflict Mitigation

Taking a Harmonious–Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	IUCN	International Union for Conservation of Nature
CCTV	Closed-circuit television	JFM	Joint Forest Management
CWLW	Chief Wildlife Warden	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-governmental organisation
DFO	Divisional Forest Officer	NTCA	National Tiger Conservation Authority
DLCC	District-Level Coordination Committee	NTG	National Technical Group
EDC	Eco-development Committee	NWAP	National Wildlife Action Plan
EIA	Environmental impact assessment	OPs	Operating procedures
EWRR	Early Warning and Rapid Response	PA	Protected area
GIS	Geographical information system	PCCF	Principal Chief Conservator of Forest
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	PPE	Personal protective equipment
Gol	Government of India	PRT	Primary Response Team
HLC	Human–Leopard conflict	RFID	Radio frequency identification
HOFF	Head of Forest Force (in a state)	RRT	Rapid Response Team
HWC	Human–wildlife conflict	SDRF	State Disaster Response Force
HWC-MAP	Human–Wildlife Conflict Management Action Plan	SFD	State forest department
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SHG	Self-help group
HWC-SAP	State-Level HWC Mitigation Strategy and Action Plan	SLCC	State-Level Coordination Committee
IFS	Indian Forest Service	SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	6
1.1 The overall context	6
1.2 Purpose and scope	6
1.3 Approach	6
1.4 Legal and policy framework for implementing the guidelines	6
1.5 Institutional mechanism for implementing these guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of HLC	8
3.1 Overall measures	8
3.2 Monitoring and managing habitat-related drivers and pressures	8
3.3 Population management at interfaces or conflict hotspots	8
3.4 Community Awareness and Communication Measures to facilitate effective engagement of local communities in HLC mitigation	9
3.5 Effective garbage management and safe sanitation in and around HLC hotspots	9
3.6 Systematic research and monitoring addressing HLC	9
3.7 Measures to strengthen the system of knowledge management related to HLC mitigation	10
3.8 Measures to strengthen the role of key stakeholders and cross-sector and inter-agency cooperation for HLC mitigation	12
3.9 Facilitating capacity development measures to develop the required competencies for addressing HLC in the most effective and efficient manner	10
4. Deploying Measures to Prevent Human-Leopard Conflicts	11
4.1 Overall measures	11
4.2 Identification of HLC hotspots	11
4.3 Effective use of Early Warning and Rapid Response system at HLC hotspots	11
4.4 Monitor and document 'potential Leopards-in-conflict' in the landscape	11
4.5 Support local population by preventing accidental encounters with Leopards	12
4.6 Support the local community in guarding livestock, poultry and other animals	12
4.7 Addressing zoonotic and other emerging diseases, taking a One Health approach	12
5. Addressing the Emergency Situations Arising due to HLC	13
5.1 Establishment of emergency response mechanism	13
5.2 Intra- and inter-agency coordination and cooperation	13
5.3 Preparedness of response teams	13
5.4 Action at the onset of emergencies or specific situations	14
6. Reducing the Impact of HLC on the Health and Well-being of Humans	15
6.1 Addressing loss of human life and injury	15
6.2 Addressing loss of livestock	15
7. Reducing the Impact of HLC on the Health and Well-being of the Affected Leopard	15
7.1 Overall measures	15
7.2 Addressing the health of the Leopard during capture and post-capture management	15
7.3 Post-release monitoring of the Leopard	16
8. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework Related to HLC Mitigation in India	17
9. Process of Development, Pilot-Testing of these Guidelines and Consultation Process	17
10. Monitoring and Evaluation of Guidelines	17
Annexe 1	18
National Technical Group (NTG)	18
Working Group on Pilot Implementation of Guidelines and HWC-NAP	18
Author Group for drafting the guidelines	18

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on human–Leopard conflict (HLC) mitigation get the overall context from the Wild Life (Protection) Act, 1972, National Wildlife Action Plan (2017–31)¹, the Advisory to Deal with Human–Wildlife Conflicts (MoEF&CC 2021) and the National Human–Wildlife Conflict Mitigation Strategy and Action Plan (HWC-NAP) (2021–26)². HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good practice documents on human–carnivore conflict mitigation issued by the National Tiger Conservation Authority (NTCA)³ and advisories and standard operating procedures (SOPs) issued by various state forest departments⁴ and build on them to bring about a more holistic approach to HLC mitigation.
- In addition to the HLC mitigation guidelines, following guidelines are to provide guidance on other selected species: guidelines for mitigating human–Elephant, –Gaur, –Snake, –Crocodile, –Wild Pig, –Bear, –Blue Bull, –Rhesus Macaque, and –Blackbuck conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of the HLC in India, leading to co-existence, to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and leopards.
- The guidelines provide advice on mitigation measures to be used to address HLC in the long term as well as facilitate the development, assessment, customisation and evaluation of site-specific HLC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HLC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HLC mitigation and are not limited to the state forest departments.
- The guidelines will be able to bring in more effectiveness and efficiency when they are fully integrated into the Division-Level HWC Management Action Plans (HWC-MAP) and State-Level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTING THESE GUIDELINES

- The institutional mechanism outlined in HWC-NAP will be followed for implementing these guidelines.

1 MoEF&CC (2017). National Wildlife Action Plan (2017–35)

2 National HWC Mitigation Strategy and Action Plan of India (2021–26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 https://ntca.gov.in/assets/uploads/sops/Guidelines_bigger_cats_man.pdf; <https://ntca.gov.in/reports/#test-guideline>

4 <https://moef.gov.in/wp-content/uploads/2017/07/moef-guidelines-2011-human-leopard-conflict-management.pdf>

5 ‘Harmonious coexistence’ is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human–wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and that of humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

6 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence⁵ approach to ensure that both humans and Leopards are protected from the negative impacts of HLC.
- The guidelines address the issue of HLC, taking a holistic approach. The holistic approach of the guidelines entails not only addressing the emergency situations arising due to immediate conflict situations but also addressing the drivers and pressures that lead to HLC; providing guidance on establishing and managing prevention methods; and reducing the impact of the conflict on both humans and Leopards.
- The development of these guidelines and the intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HLC mitigation measures with key sectors and stakeholders at national, state and local levels.
- The guidelines facilitate a landscape approach while formulating measures for mitigating HLC to ensure sustainable solutions as unless comprehensive and integrated HLC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementation through provision of *Implementer’s Toolkit*, which includes Operating Procedures (OPs), formats, checklists, and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act, 1972.
- The following laws are considered directly relevant for conservation when dealing with HLC:
 - Wild Life (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HLC.
- The Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India⁶ may be referred to for more details on the specific legal provisions related to HWC mitigation.
- Other important legislations that facilitate conservation when dealing with HLC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; and Disaster Management Act, 2005.

2. CONTEXT AND SITUATION

- The Leopard, also known as the Common Leopard (*Panthera pardus*), is the most widely distributed felid species, occupying a wide variety of landscapes across Africa and Asia. Although the range size has contracted substantially, the species has shown remarkable resilience in countries like India, where both the Leopard population and the interface with humans have increased. The sub-species in India (*Panthera pardus fusca*) is solitary, except when with family groups, and shows a high level of habitat and behavioural adaptability. It is an important predator that offers multiple ecosystem services as its dietary preference includes small rodents and large herbivores.
- Given its body size and elusive habits, it plays a key role in maintaining the integrity of prey populations as well as those of meso-predators through competitive exclusion and prey-regulation processes. It continues to remain an important predator even in the areas where other large carnivores such as the Tiger (*Panthera tigris*) and Lion (*Panthera leo persica*) exist, and it plays an enhanced role where these have low population densities or are absent.
- In India, the most significant threat to human life posed by large carnivores comes from Leopards. Human-Leopard Conflict (HLC) refers to the negative interactions between humans and Leopards, leading to adverse impacts on humans or their resources, such as human injury and death, loss of property (cattle, poultry, etc.) and effects on their emotional well-being, and on Leopards or their habitats.
- HLC is more common than human–Tiger conflict because of the much wider distribution and larger population of the Leopard.
- The drivers of HLC emanate from biological, socio-economic, behavioural and development aspects, and each of these has independent repercussions and combined effects, depending on the space and time. The general drivers of HLC include a disproportionate growth of the human population density, habitat fragmentation and degradation, development activities such as creation of linear infrastructure, disruption of connectivity/corridors, continued forest-dependence of humans for livelihoods, inadequate stakeholder engagement and current gaps in understanding Leopard behaviour in human-dominated landscapes.
- Loss of livelihood opportunities, other economic losses, negative emotional impacts and human deaths and injuries are key impacts on humans that result in growing intolerance towards Leopards in specific and wildlife in general, subsequently leading to retaliatory action from humans towards Leopards.
- Several measures are being implemented to mitigate HLC, including making *ex gratia* payments for human injuries and losses, establishing Rapid Response Teams (RRT), using early warning equipment (such as camera traps and radio collars/chips), carrying out forensic investigations and capturing and translocating or confining Leopards.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HLC

3.1 OVERALL MEASURES

HWC-NAP recommends a holistic approach to HWC mitigation in which the thematic triangle of drivers–prevention–damage mitigation is considered and addressed. These guidelines have been prepared in line with the recommended holistic approach to bridge the current gap.

Effective and sustainable mitigation of HLC involves effective problem analysis to identify drivers and pressures of conflict. Such analysis will allow appropriate selection of mitigation measures.

- An assessment of the long-term outcomes and implications of all mitigation measures is needed to identify effective and wildlife-friendly mitigation measures to address HLC. For this, a systematic analysis of HLC mitigation measures may be performed to assess their effectiveness and wildlife-friendliness in different types of conflict situation. This will facilitate the necessary customisation and adaptation of the mitigation measures to achieve the best possible impacts in the field.
- Cross-sectoral cooperation is critical for addressing drivers of conflict through improved land-use planning and other measures and for customising the mitigation measures.

3.2 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

- Mapping of existing drivers and pressures of HLC, adopting a landscape approach
- Mapping of the Leopard distribution and numbers in community forest areas with a population and habitat viability analysis to determine where and what can be conserved
- Mapping land tenure and identification of human communities who are stakeholders in the landscape.
- Implementing measures for consolidation of forests and habitat restoration, fire management, invasive species removal and clearing vistas along the boundaries of forests close to habitations to avoid accidental encounters.

- Following linear infrastructure guidelines⁷ for linear development projects.
- Preparing, implementing and periodically updating long-term perspective plans such as state-level Human-Wildlife Conflict Mitigation Strategy and Action Plans (HWC-SAP) and Division-Level HWC Management Action Plans. A common framework for developing these plans is provided in the Supplementary Frameworks to the HWC-NAP⁸.
- Facilitating long-term studies to understand the impact of these measures in addressing the drivers and pressures in the landscapes.
- Accidental encounters of humans with Leopards inside forests or at the fringes can be prevented to a large extent by reducing the dependence of humans on forests.

3.3 POPULATION MANAGEMENT AT INTERFACES OR CONFLICT HOTSPOTS

A local overabundance⁹ of wildlife, including Leopards, could be due to various factors, including changes in the habitat nearby, an increase in the population of Leopards and successful protection measures. The Leopard populations in several forest-fringe areas and peri-urban areas have become habituated to humans, and therefore there needs to be a clear understanding of their spatio-temporal distributions, their feeding and movement patterns and their use of the human-dominated landscape. The following measures are envisaged to facilitate Leopard population management in such hotspots:

- SFDs may adopt a robust population monitoring protocol and implement it using trained field staff members or in collaboration with research institutes or local universities/colleges
- The dispersing Leopard population, which has colonised new areas, needs to be assessed for its impact on the well-being of humans and Leopards.
- The population dynamics of resident Leopards in crop fields and plantations and the changes in their behavioural attributes may be studied to develop customized mitigation measures.

7 Eco-friendly Measures to Mitigate Impacts from Linear Infrastructure on Wildlife: https://moef.gov.in/wp-content/uploads/2019/07/eco_friendly_measures_mitigate_impacts_linear_infra_wildlife_compressed.pdf

8 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

9 'Local overabundance' refers to the occurrence, in a habitat, of an excessive number of individuals of a species beyond the normal population density due to a variety of factors.

3.4 COMMUNITY AWARENESS AND COMMUNICATION MEASURES TO FACILITATE EFFECTIVE ENGAGEMENT OF LOCAL COMMUNITIES IN HLC MITIGATION

To facilitate effective engagement of local communities and various stakeholders in mitigation of HLC, it is extremely important to plan and implement awareness and sensitisation measures, adopting a participatory approach.

- Appropriate community awareness and communication measures may be implemented at HLC hotspots, and their impacts may be assessed periodically to ensure that the awareness and communication measures are locally customised.
- Training programmes and other capacity development measures and extension programmes may be implemented for school and college students, women's self-help groups, village forest committees (VFCs), eco-development committees (EDCs), large area multipurpose societies (LAMPs), forest user groups, etc. The EDCs/VFCs formed by the state forest departments in villages abutting a forest area at HLC hotspots may be made functional and their sustainability ensured through accrual of benefits and incentives.
- Participation of key stakeholders may be facilitated to ensure the integration of traditional and local knowledge and experience into the development of Division-Level HWC-MAPs to facilitate Leopard conservation and development of measures for HLC mitigation.

3.5 EFFECTIVE GARBAGE MANAGEMENT AND SAFE SANITATION IN AND AROUND HLC HOTSPOTS

Garbage is known to attract stray and feral dogs, cattle and monkeys and consequently may attract Leopards. When garbage dumps are located on the periphery of or inside a village/town, high levels of conflict may result.

The vegetable and food waste generated at weekly markets in rural India and the garbage thrown along roads and railway lines passing through forests also attract stray and feral dogs, cattle and monkeys and consequently may attract Leopards. Accidental encounters in the rural areas often take place when humans go into the forest for defecation, especially at dawn and dusk.

The following are indicative measures to address the situation:

- Ensuring sustainable and ecologically sound waste and garbage disposal by town municipalities and village panchayats at the borders of Leopard habitats, especially at HLC hotspots.
- Undertaking periodic inspection, by SFDs and other government departments/organisations, of the forest perimeter near villages/towns to ensure that poor disposal of waste and garbage is detected early and brought to the notice of relevant local authorities. Volunteers can be engaged for this.
- Community awareness and signage to facilitate effective participation by local communities in garbage management.
- SFDs may also coordinate with municipalities/panchayats on garbage management and explore the possibility of getting toilets built under the Swachh Bharat Mission to prevent accidental encounters at HLC hotspots.

3.6 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HLC

The following research and monitoring studies may be prioritised. They are expected to answer the existing management questions and provide insights for long-term planning:

- Estimating and monitoring the population and carrying capacity of Leopards using camera trapping and distance sampling in the landscape; monitoring the population density, distribution and spatio-temporal changes in the distribution and occupancy of the prey base in the habitat.
- Resource use pattern of Leopards in the forest-human interface areas; identifying the correlates that facilitate Leopard persistence at the forest fringes.
- Movement ecology involving telemetry with mapping and predicting the conflict probability within and between landscapes; effect of fragmentation and linear infrastructure on the HLC patterns and future directions.
- Mapping ecosystem services provided by Leopards; the economics of HLC mitigation.
- Assessment of people's perceptions of Leopards and related factors enabling co-existence.
- Effectiveness and wildlife-friendliness of different mitigation measures.
- Modelling the HLC dynamics and risk probability in the context of forest cover change, human population growth, development projects, disasters (including fires and landslides) and the effects of climate change.

3.7 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT RELATED TO HLC MITIGATION

To ensure that HLC mitigation measures are effective and sustainable, it is essential that field experiences, learnings, field-evidence and conceptual advances be not only shared across key stakeholders and landscapes but also documented to be utilised for future strategies and plans related to HLC mitigation.

- Developing a strong knowledge base at each HLC hotspot on the territorial behaviour of Leopards.
- Landscape-level multi-stakeholder fora and appropriate working groups may be used to share field experiences and learnings, within the Forest Department, with stakeholders and across landscapes.
- Measures to be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances in HLC mitigation, to inform the future strategies and plans with regard to HLC mitigation

3.8 MEASURES TO STRENGTHEN THE ROLE OF KEY STAKEHOLDERS AND CROSS-SECTOR AND INTER-AGENCY COOPERATION FOR HLC MITIGATION

Cross-sectoral cooperation for HLC mitigation entails that multiple stakeholders from different sectors and domains be engaged, at the national, state, landscape and district/forest division levels. Key stakeholders in HLC mitigation may include the state forest department and other line departments, viz., the Agriculture, Revenue, Animal Husbandry, Police, Public Works, Health and Family Welfare and Education departments, and electricity boards. The private sector (tea or coffee plantations), agencies, viz., the railways and the National Highway Authority of India, wildlife conservation and development NGOs, farmers' cooperatives and agricultural research institutions are relevant when dealing with conflict and conflict mitigation.

The following measures are envisaged:

- State-Level Coordination Committees (SLCC), landscape-level multi-stakeholder fora and District-Level Coordination Committees (DLCC) may be used to strengthen the inter-agency coordination required for HLC, and a district-specific operational mechanism may be developed to address specific needs of HLC mitigation.

- Maintaining information and data on HLC cases with reference to the developments in the area that may have a bearing on conflict cases (for use in discussions in the DLCC).

3.9 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HLC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

Capacity development of SFDs, other line departments, local communities and all key stakeholders may be facilitated to ensure that a holistic approach is adopted:

- The SFDs may ensure that all response team personnel from the Forest Department and other line departments and agencies are brought under a systematic approach to capacity development, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*¹⁰.
- Arrangements for deployment of personnel and taking quick action on cognisance of conflict cases to be strengthened in each forest division, and a system of resource sharing (e.g., specialised experts from response teams, other staff members and experts, and equipment across forest divisions) to be developed

¹⁰ Supplementary framework to HWC-NAP on establishment and capacity development of HWC mitigation response teams: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

4. DEPLOYING MEASURES TO PREVENT HUMAN-LEOPARD CONFLICTS

4.1 OVERALL MEASURES

The type of conflict and the mitigation depend on where the conflict is occurring and what its impact is on humans and Leopards. HLC locations can be broadly grouped into three categories, each of which requires different mitigation methods, with some overlap:

- Those occurring inside forests (possible choice of mitigation measures—minimising forest use, capacity development).
- Those occurring at the interface (possible choice of mitigation measures—early warning and rapid response, capacity development, barriers and deterrents).
- Those occurring in human-dominated areas (possible choice of mitigation measures—securing habitats for conservation).

The following preventive measures therefore need to be implemented.

4.2 IDENTIFICATION OF HLC HOTSPOTS

- Identifying conflict hotspots¹¹ that could also provide a direction towards the drivers of conflict is critical to provide site-specific solutions to mitigate HLC. HLC conflict hotspots may be mapped through geo-spatial assessments, by using both primary data and secondary data, including time-series data. Hotspots can be identified and mapped as follows.
 - **Incident hotspot:** Frequency of occurrence of incidences over a specific period in the past, such as 5 or 10 years, mapped over the target area. The data include the number of incidences of injury and death and crop and property damage.
 - **Vulnerability hotspot:** Cumulative index determined by overlaying past incidents, the vulnerability of the local community and the potential risk of the area.
- The hotspot data should be overlaid on a GIS platform to generate a map of the ranging pattern of the animal- in-conflict to delineate its residence and movements in the

core zone, interface zone and forest-fringe area zone (agriculture–forest matrix) in PAs.

- The use of predictive modelling based on geo-spatial data for hotspot mapping and robust spatial analyses and modelling tools, including scenario building, may be explored.
- The database available with the National Tiger Conservation Authority (NTCA) may be used to map the leopard population with regard to the natural habitats and various characteristics of adjoining landscapes. A suitability analysis can result in assessment of potential zones of HLC, which will help plan effective mitigation measures.

4.3 EFFECTIVE USE OF EARLY WARNING AND RAPID RESPONSE SYSTEM AT HLC HOTSPOTS

- An Early Warning and Rapid Response (EWRR) system¹² may be established and used to enhance the overall efficiency of mitigation efforts in the field. The EWRR system may be in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*¹³.
- The EWRR system may be used to detect Leopard conflicts early and to respond appropriately.

4.4 MONITOR AND DOCUMENT 'POTENTIAL LEOPARDS-IN-CONFLICT' IN THE LANDSCAPE

A potential Leopard-in-conflict is an individual that is likely to enter a HLC situation owing to its movement pattern or other behaviour.

Potential Leopards-in-conflict at the forest–agriculture interface may be monitored, as a preparedness and prevention measure, to ensure that their movements in the human-dominated landscape do not lead to an emergency situation.

11 'HWC hotspots' are areas with actual or predicted repeated occurrences of HWC incidents resulting in crop-loss, livestock death, human death and injury, and wildlife death and injury over temporal and spatial scales. The HWC can be static (repeated in the same place or time) or dynamic (shift in space over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

12 EWRR is a set of tools, processes and personnel competencies needed for timely and meaningful generation and dissemination of alert information to individuals, communities and establishments at risk, for optimal preparedness and responses at the appropriate time, to reduce the likelihood of injury, death or crop damage. EWRR structurally includes an HWC Mitigation Hub/Control Room and a system of three-tiered response teams, viz., Division-Level Rapid Response teams (Division RRTs), Range-Level Rapid Response Teams (Range RRTs) and village-/ward-level Primary Response Teams of the local community (Community PRTs).

13 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

The following are some examples of monitoring methods:

- SFDs may develop an identification database of Leopard individuals, their movement patterns within human-dominated landscapes and the conflicts that they were involved in. This will help identify Leopards-in-conflict in emergency situations.
- Developing a protocol for identification and monitoring of potential and actual Leopards-in-conflict across the landscape.
- Monitor the movements of Leopards in the landscape by recording direct observations and indirect evidence (to generate presence–absence data), interviewing local people about Leopard presence and movement patterns and using camera traps, radio collars and mobile applications, depending on availability and feasibility.

4.5 SUPPORT LOCAL POPULATION BY PREVENTING ACCIDENTAL ENCOUNTERS WITH LEOPARDS

- SFDs may facilitate, encourage and seek support from local NGOs, volunteers and other stakeholders to implement safety measures aimed at preventing human–Leopard encounters. These measures may include guiding humans to watch for signs of Leopard presence around dawn and dusk, in general, and specifically in bushy areas in and around villages/ towns, and to respond appropriately when they encounter a Leopard.
- Briefing of vulnerable groups, including workers of crop fields and tea or other plantations, about the Leopard risk and safety issues may be done before every work season.
- Regular training programmes in local schools and colleges, and possibly during village meetings, at HLC hotspots may be organised to train humans about safety measures.
- It is important to clear bushes around residential areas, village commons and abandoned fields at HLC hotspots where a Leopard population has become resident outside a forest and is taking shelter in small insular vegetation patches in human-dominated areas. This will prevent opportunistic and accidental encounters between Leopards and humans.
- SFDs may facilitate panchayats to light HLC hotspots adequately by installing street/solar lights.
- Safety audits¹⁴ may be conducted each year, if feasible, to ensure that all members of the community act responsibly in case of HLC and to facilitate inter-agency cooperation.

4.6 SUPPORT THE LOCAL COMMUNITY IN GUARDING LIVESTOCK, POULTRY AND OTHER ANIMALS

- The community may be facilitated to develop predator-proof enclosures for livestock/poultry/other animals. Such structures may be made of stones, wire mesh, wire fences, tin, wood or any locally available material. In the case of migratory shepherds, where such semi-permanent structures are not practical, collapsible net fences may be used that are 6 feet or more high. Camping sites should not have any overhanging tree on which a Leopard may climb and then jump in. Such structures still need to be actively guarded at night to prevent predator entry.
- The areas around livestock and poultry enclosures should be well-lit at night. Solar lights may be installed where the availability of a continuous supply of electricity is a challenge.
- As a continuous process, institutions and experts may be engaged at the national and state levels to develop innovative designs for such predator-proof enclosures and to develop other methods for guarding livestock, poultry and other animals.

4.7 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH¹⁵

The response teams and other stakeholders at HLC hotspots are vulnerable to a variety of zoonotic diseases that can be transmitted from animals to humans, apart from the risk of disease transmission from humans to domestic animals and wildlife:

- Veterinary capacities and infrastructure may be upgraded to facilitate disease monitoring in Leopard populations, for both Leopard conservation and to prevent the spread of zoonotic diseases to livestock and human populations.
- To reduce the biotic pressure on forests and prevent the spread of zoonotic diseases, it is desirable to stall-feed high-yielding cattle.
- A well-formulated Wildlife Health Management and Disease Surveillance Plan may be developed at every division/protected area (PA).
- All personnel involved in capture operations may be trained, vaccinated and equipped.
- The basic approach may be to integrate the concept of One Health, which links human and animal health in a shared environment into all the operations and HLC mitigation measures in the field.

¹⁴ A safety audit is a process for pro-actively and periodically evaluating the mitigation measures in place at a site for their effectiveness and wildlife-friendliness.

¹⁵ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HLC

This is an indicative list of the potential emergency¹⁶ situations:

- A human has been killed/injured.
- A Leopard has been trapped in a snare or other such trap or has fallen into a well or similar place and needs to be rescued.
- A Leopard has entered a building, an animal shelter or a housing area.
- Livestock have been injured or are dead because of a Leopard.
- A Leopard death has occurred due to retaliatory action by humans.
- A Leopard has been sighted in the vicinity of a human habitation.

Key response procedures are to be established, and actions promptly implemented/undertaken, for addressing emergency situations. Detailed step-by-step guidance may be developed in the form of Operating Procedures for Addressing Emergency Response Situations.

The key emergency response procedures include the following.

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

A strong institutional mechanism is required to respond to an emergency situation arising due to HLC. This starts with detection of the incident, communication to the Control Room and dissemination of information to the officials and staff in the command-and-control hierarchy, including the Forest Department and civil administration, for initiation of appropriate response actions. The divisional forest office coordinates action by deploying RRTs to the incident site. The field support operations may be structured around the following key operational stages for synchronisation of activities to meet the emergency:

- Monitoring and situational awareness.
- Mitigation Hubs/Control Room/helplines to receive and disseminate information.
- RRT/PRT personnel, a veterinary team, drugs and equipment, and mobility and communication facilities are needed to address the emergency situation effectively and efficiently.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Operating procedures may be laid down in each forest division/district in line with these guidelines and in line with the institutional framework suggested under the HWC-NAP to ensure timely coordination amongst the various response teams from the Forest Department and other agencies, under the DLCC, consisting of the District Magistrate/District Collector, the police, the fire services, the Animal Husbandry Department, the Health Department, SDRF, Agriculture Department, Department of Rural Development and Panchayati Raj, paramilitary forces, and other key relevant departments and agencies., and the local community, especially panchayat leaders and community PRTs.

5.3 PREPAREDNESS OF RESPONSE TEAMS

- A structured mechanism may be established to deploy competent personnel in the RRTs, and to ensure periodic competencies-development measures for them, including training, role clarity and equipment. The Area of Operation of each RRTs may be fixed in such a way that facilitates timely response from the RRTs. *Supplementary Framework on Establishment and Capacity Development of HWC Mitigation Response Teams* may be referred to for composition of the RRTs and role clarity.
- Operating Procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (Community PRTs, RRTs) are established through training sessions and other measures, including training in relation to occupational health and safety.
- Operating Procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of the need to prevent, manage and control zoonotic diseases and pandemics effectively.

¹⁶ An emergency or crisis situation can be defined as a situation that is sudden, unexpected, has the potential to be serious/is serious in nature and therefore requires immediate intervention in time and space from concerned stakeholders to minimise the loss of lives and assets. The response to such emergencies involves prompt handling of situations, ensuring reduced vulnerabilities of humans and Leopards.

5.4 ACTION AT THE ONSET OF EMERGENCIES OR SPECIFIC SITUATIONS

5.4.1 Identification of Leopards-in-Conflict

- Leopards-in-conflict may be:
 - Leopards with their home ranges adjoining the periphery of a forest
 - Transient young animals in search of territories
 - Leopards that have been displaced from their territories and are injured or old
 - Leopards that may permanently move to the periphery of a forest and become habitual predators.

The following steps may be taken by the field officer to identify the Leopard-in-conflict.

Immediate steps in the field

- The conflict location may be cordoned off first.
- Trace pugmarks with details of pug size and stride details to avoid confusion with other cat species.
- Investigate the area within a radius of 100 m of the incident-location, focusing on the animal trails, remains of the victim, including any on the tree components, and any carcass/waste dumps.
- Deploy two to four camera traps with white flashes and infrared flashes, with one/two of them being in the still mode and the other one/two in the video mode.
- Shortlist the leopards based on existing database, and newly deployed camera traps based on higher frequency of occurrence and any apparent behavioural reflection such as old-age and body injury in the leopard.
- All shortlisted Leopards may be considered as potential Leopards-in-conflict.

Steps to gather corroborative evidence, if feasible

- Cut-marks and the sharpness of the flesh-tearing evidence may be recorded during the postmortem examination.
- Collection of DNA samples, wherever possible, including from the victim.
- Investigate the existing camera trap database, if available, and identify the Leopard-in-conflict on the basis of the rosette pattern and its frequency of capture in and around the conflict location.
- Investigate the details of the incident through the staff and local communities for corroboration with the circumstantial evidence.
- Training sessions on identification of Leopards-in-conflict may be organised for dedicated personnel of the Forest Department or, preferably, joint inter-agency and multi-stakeholder teams, using the training approach as indicated in the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*¹⁷.

5.4.2 Other Key Response Actions during and after an Emergency

- Operating procedures may be laid down, in line with the other guidelines issued by MoEF&CC, for step-wise key actions, for all emergency situations, media engagement, crowd management, addressing health emergencies and post-response operation for the management of the animal. This includes ensuring the animal's health and safety during capture, transport, selection of a translocation site and monitoring the animal after releasing it safely back into the wild.

¹⁷ Supplementary framework to HWC-NAP on establishment and capacity development of HWC mitigation response teams: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

6. REDUCING THE IMPACT OF HLC ON THE HEALTH AND WELL-BEING OF HUMANS

Key manifestations of HLC are human death/injury, livestock loss and retaliatory killing of or injury to a Leopard.

6.1 ADDRESSING LOSS OF HUMAN LIFE AND INJURY

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family should be made into their bank accounts.
- In HLC hotspots, a revolving fund may also be established, at the division-level, to ensure that funds are available for providing immediate relief to the victim/family.
- In the case of an injury as a result of an encounter with a Leopard, the victim needs to be immediately hospitalised and *ex gratia* payments made as per the norms of the state government.
- Professional counselling through qualified psychiatrists/health workers will be useful to check

the effects of such traumatic incidents. The SFDs and other government agencies/institutions may organise some counselling sessions for such victims and support them as they recover from the psychological impact.

- In general, efforts are to be made for simplification of procedure for release of *ex gratia* to facilitate faster payments, to ensure timely support to the affected humans.

6.2 ADDRESSING LOSS OF LIVESTOCK

- Loss of livestock should be compensated in accordance with government norms, at the earliest.
- An app-based system may be used to expedite the process of making an *ex gratia* payment to the owner of the dead animal.
- SFDs may coordinate with the respective Panchayats/resident welfare associations for the *ex gratia* payment in the event of a loss of livestock.

7. REDUCING THE IMPACT OF HLC ON THE HEALTH AND WELL-BEING OF THE AFFECTED LEOPARD

7.1 OVERALL MEASURES

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Articles 48A and 51A(g)) and as per the statutory provisions made under the Indian Penal Code (Sections 428 and 429), Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)) and Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC, including the NTCA.
- Efforts should be made to strengthen inter-agency cooperation, and to receive support from local agencies responsible for law and order, so that the emergency operations are completed without delay and the health and well-being of the animal is ensured.

7.2 ADDRESSING THE HEALTH OF THE LEOPARD DURING CAPTURE AND POST-CAPTURE MANAGEMENT

- Use a humane technique and drug of choice for chemical immobilisation of the target Leopard.
- Ensure that the immobilisation is complete, not partial, to prevent the Leopard from injuring itself as well as others.
- The captured Leopard may be blindfolded and the cage may be covered to avoid disturbance and stress.
- Minimise the noise.
- All the vital parameters of the Leopard may be thoroughly examined after the capture.
- The process of capture and transport should cause minimal stress and trauma to the animal. The size and design of the transportation box/cage should be in accordance with the guidelines issued by the

Central Zoo Authority (CZA)¹⁸. Food and water should be provided to the Leopard during transportation. Halts may be planned as per the guidelines during long journeys.

- The housing of the animal after it is captured should be in accordance with the guidelines issued by the CZA¹⁹. Sanitation and the hygiene of the enclosure should be maintained as per CZA guidelines.

7.3 POST-RELEASE MONITORING OF THE LEOPARD

- The translocation and rehabilitation of a Leopard in the wild is to be planned in line with the Standard Operating Procedures (SOPs) of the NTCA²⁰.
- Advance preparation may be made for identifying a suitable potential area for the release of the Leopard on the basis of a scientific assessment of the habitat, the historic existence of Leopards at the site, the existing abundance and density of Leopards and the availability of water and suitable natural wild prey.
- The potential release site to have a low abundance of Leopards.
- Monitoring of Leopards may be done after relocation or translocation, with the following technology:
 - Radio-tracking through satellites or GPS, if available, can be done. Deploying collars with the 'remote drop-off option' facilitates retrieval of a collar without having to recapture the Leopard.
 - Radio frequency identity (RFID) microchips (PIT tags) may be used for tagging all captured (not radio-collared) Leopards before release or when they are brought to captivity.
- Establishment of pugmark impression pads with or without cat-lures can be used for monitoring in situations where collaring is not technically or otherwise feasible.
- A network of camera traps can be deployed to monitor the released Leopard.
- A systematic record of all the aspects (permits, capture, drug chart, capture location, release location, distance from the capture site, etc.) may be maintained.

18 Manual of transport cages and nest boxes: <https://cza.nic.in/uploads/ocuments/publications/english/TRANSPORT%208.1.2008.pdf>

19 <https://cza.nic.in/page/en/recognition-of-zoo-rules-2009>

20 SOPs for rehabilitation of Leopards: https://ntca.gov.in/assets/uploads/sops/Compendium_SOPs.pdf

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK RELATED TO HLC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback on them.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for fine-tuning these mitigation measures and for understanding the capacity needs for effectively implementing the mitigation measures.

In the long term, the consolidated feedback may also be used in further reviewing the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP. This, combined with a centralised system of HLC related data collection and analysis will facilitate learning for fine-tuning future interventions for HLC mitigation.

9. PROCESS OF DEVELOPMENT, PILOT-TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives from Government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology²¹. The experts had different roles in the drafting and editing process, viz., Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII), *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and independent wildlife and

policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned

to take place every 5 years from 2023 onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- Detailed mechanism, templates and guidance used for collating information and feedback on the use of these guidelines may be developed.

21 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Ministry of Environment,
Forest and Climate Change,
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Guidelines for Mitigating Human–Snake Conflict

Taking a Harmonious Coexistence Approach



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Ministry of Environment, Forest and Climate Change



National Centre for Disease Control



Government of India



Ministry of Environment,
Forest and Climate Change,
Government of India

Guidelines for Mitigating Human–Snake Conflict

Taking a Harmonious Coexistence Approach

Abbreviations

ANM	Auxiliary nurse midwife	IFS	Indian Forest Service
ASHA	Accredited social health activist	IUCN	International Union for Conservation of Nature
AWW	Anganwadi worker	JFM	Joint forest management
BMZ	German Federal Ministry for Economic Cooperation and Development	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CPR	Cardiopulmonary resuscitation	MoHFW	Ministry of Health & Family Welfare
CCTV	Closed-circuit television	NCDC	National Centre for Disease Control
CWLW	Chief Wildlife Warden	NDRF	National Disaster Response Force
CZA	Central Zoo Authority	NGO	Non-governmental organisation
DBT	Direct benefit transfer	NTCA	National Tiger Conservation Authority
DFO	Divisional Forest Officer	NTG	National Technical Group
DLCC	District-Level Coordination Committee	NWAP	National Wildlife Action Plan
EDC	Eco-development Committee	OPs	Operating procedures
EIA	Environmental impact assessment	PA	Protected area
EWRR	Early Warning and Rapid Response	PCCF	Principal Chief Conservator of Forest
GIS	Geographical information system	PPE	Personal protective equipment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PRT	Primary Response Team
GoI	Government of India	RFID	Radio frequency identification
HOFF	Head of Forest Force (in a state)	RRT	Rapid Response Team
HSC	Human—snake conflict	SDRF	State Disaster Response Force
HWC	Human—wildlife conflict	SFD	State forest department
HWC-MAP	Human–Wildlife Conflict Management Action Plan	SHG	Self-help group
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SLCC	State-Level Coordination Committee
HWC-SAP	State-Level Human—Wildlife Conflict Mitigation Strategy and Action Plan	SOPs	Standard operating procedures
IDSP	Integrated Disease Surveillance Programme	STG	Standard Treatment Guidelines
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

1. About the Guidelines	2
1.1 The overall context	2
1.2 Purpose and scope	2
1.3 Approach	2
1.4 Legal and policy framework for implementing the guidelines	3
1.5 Institutional framework for implementing the guidelines	3
2. Context and Situation	4
3. Awareness Measures to Prevent Accidental Encounters and to Reduce Retaliatory or Preventive Killing of Snakes	5
4. Strengthening the Role of Key Stakeholders and Facilitating Cross-sector Cooperation	7
5. Systematic Research and Monitoring for HSC Mitigation	8
6. Snake-Venom Collection	9
7. Facilitating Capacity Development Measures to Develop the Required Competencies for Addressing HSC in the Most Effective and Efficient Manner	10
8. Addressing the Emergency Situations Arising due to HSC	11
8.1 Overall measures	11
8.2 Reducing the Impact of HSC on the Health and Well-being of the Humans	11
8.2.1 Overall measures	11
8.2.2. Addressing zoonotic and other emerging diseases, taking a One Health approach	12
8.3 Reducing the Impact of HSC on the Health and Well-being of the Snakes	12
8.4 Effective Use of Early Warning and Rapid Response System at HSC Hotspots	13
9. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework on Health Emergencies in HWC Situations in India	14
10. Process of Development and Pilot Testing of These Guidelines and the Consultation Process	14
11. Monitoring and Evaluation of Guidelines	14
Annexe I	15
National Technical Group (NTG)	15
Working Group on Pilot Implementation of Guidelines and HWC-NAP	15
Author Group for Developing these Guidelines	15

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on human—snake conflict (HSC) mitigation get the overall context from the Wild Life (Protection) Act, 1972, National Wildlife Action Plan (2017—31)¹ and National Human–Wildlife Conflict Mitigation Strategy and Action Plan (HWC-NAP) (2021-26)². HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines. This document takes into consideration the existing policies, guidelines, advisories and good practices issued by the Government of India and various state governments related to HSC mitigation.
- These guidelines take into consideration the Prevention and Control of Snake Bite Envenoming in India, being implemented through the National Health Mission by the Ministry of Health & Family Welfare (MoHFW), Government of India.
- The following guidelines are to provide guidance on selected species: guidelines for mitigating human–Leopard, –Elephant, –Gaur, –Crocodile, –Wild Pig, –Bear, –Blue Bull, –Rhesus Macaque and –Blackbuck conflicts.
- Also, the following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Forest–Media Cooperation; Occupational Health and Safety; Crowd Management in HWC-Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human—Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- These guidelines aim to facilitate a common understanding of what constitutes effective and efficient mitigation of HSC in India that will lead to harmonious coexistence. The guidelines are meant to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and snakes.

- The guidelines provide advice on mitigation measures to be used to address HSC in the long term as well as facilitate the development, assessment, customisation and evaluation of site-specific HSC mitigation measures that are effective and wildlife friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HSC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HSC mitigation and are not limited to the state forest departments.
- The guidelines will be able to bring in more effectiveness and efficiency when they are fully integrated into the Division-Level HWC Management Action Plans (HWC-MAP) and State-Level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence³ approach to ensure that both humans and snakes are protected from the negative impacts of HSC.
- The guidelines address the issue of HSC, taking a holistic approach. The holistic approach of the guidelines entails not only addressing the emergency situations arising due to immediate conflict situations but also addressing the drivers and pressures that lead to HSC; providing guidance on establishing and managing prevention methods; and reducing the impact of the conflict on both humans and snakes.
- The development of these guidelines and the intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HSC mitigation measures with key sectors and stakeholders at the national, state and local levels.
- The guidelines facilitate a landscape approach when formulating measures for mitigating HSC to ensure sustainable solutions as unless comprehensive and integrated HSC mitigation measures are implemented

1 MoEF&CC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human-wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and that of humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

across the landscape, the problem is likely to only shift from one place to another.

- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementation by providing the *Implementer's Toolkit*, which includes operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act, 1972.
- The following laws are considered directly relevant for conservation when dealing with HSC:
 - Wild Life (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLP 1972 are especially relevant when dealing with HSC.
- The Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India⁴ may be referred to for more details about the specific legal provisions related to HWC mitigation.
- Other important laws that facilitate conservation when dealing with HSC include the Environment Protection Act, 1986; Indian Penal Code, 1860;

Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; Indian Forest Act, 1927; Forest (Conservation) Act, 1980; Environment (Protection) Act, 1986; and Disaster Management Act, 2005.

1.5 INSTITUTIONAL FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- The institutional mechanism outlined in HWC-NAP will be followed for implementing these guidelines.
- The implementation of these guidelines may be anchored in each district, at the District-level Coordination Committee (DLCC) chaired by the respective District Collector, where the system of regular feedback and fine-tuning of the protocols and processes will be done to customise these to suit the local conditions.
- Apart from this, the Ministry of Health & Family Welfare has recently approved the implementation of Prevention and Control of Snake Bite Envenoming in India through the National Health Mission, with the provisions of all states and UTs receiving funds through the Annual Programme Implementation Plan (PIP) mechanism of the National Health Mission (NHM). The National Centre for Disease Control (NCDC) is the implementing agency for the same. The measures supported are provision of anti-snake venom through the National Free Drug Initiative, capacity building of health, veterinary and wildlife professionals, advocacy for inter-sectoral coordination with veterinary and wildlife professionals, IEC activities for community awareness on prevention of snake bites, etc.

⁴ Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2. CONTEXT AND SITUATION

Snakes are an integral part of the ecosystems in which they operate, and are related to humans in direct as well as indirect ways. Snakes play a significant role by feeding on a wide range of animals. At the same time they also serve as prey to other animals. Some snakes are expert rodent hunters, controlling a significant population of rodents that are otherwise inaccessible to other predators. Snakes, unlike most wild animals, are more likely to share the living space with humans in rural and urban landscapes alike, in extremely close proximity. Notably, some of these snake species are potentially dangerous to humans. Close encounters of humans with snakes are, for the most part, inevitable, as these animals (including venomous species) have successfully adapted to live close to human habitations that provide easy prey. These species are either pulled into such habitations in search of prey or are pushed out of natural habitats due to fragmentation and destruction of the same.

The abundance of a particular species of snake varies spatially and temporally. Young snakes (just after hatching, till they get settled in a particular territory) are naturally more abundant than adults. Similarly, highly adaptable species tend to be more abundant than the habitat specialists. The distribution and abundance of snakes also vary across landscapes and habitat types. They also vary with the adaptability of a snake to rapidly changing habitats.

In ideal conditions, snakes are secretive and are mostly encountered randomly/accidentally inside human settlements, or they may get detected when their microhabitats are disturbed through earth-moving, construction, farming activities, etc. In rural areas humans very often encounter resting snakes when removing fuelwood, cow dung or bricks from piles. Such spots offer warm and safe microhabitats for many snakes. Temporally, the chance of encounter is high during the rainy season, when snakes come out of their burrows/ hideouts due to flooding. Snakes are encountered more frequently when they find human habitations to be safe and warm places for over-wintering or for egg-laying or for easy prey-hunting (house rodents).

Venomous species, such as Russell's viper, the binocellate cobra and the common krait prefer dry areas, while the monocellate cobra and banded krait prefer moist areas such as wetlands, water-logged areas and

swampy habitats. The saw-scaled viper prefers dry, rocky terrain, scrub forests, rock piles, etc. On the basis of their activity, snakes can be classified as diurnal, nocturnal or crepuscular. However, most HSC incidents happen when humans encounter snakes outside their actual activity period. In a natural ecosystem, snakes do have inter-species competition for food and resources, and they avoid encounters. For example, rat snakes and cobras, being the most common snakes encountered near human habitations and being competitors for food and resources, often avoid each other. Hence, sensitising humans to coexist with the non-venomous rat snake might save them from the deadly cobra.

The Big Four venomous snakes, causing the maximum morbidity are the spectacled cobra (*Naja naja*), common krait (*Bungarus caeruleus*), Russell's viper (*Daboia russelli*) and saw-scaled viper (*Echis carinata*). Other than these, in general any snake (of any species) encountered by the public is likely to be harmed in retaliation, out of fear. Among the Indian snakes, some species of harmless snake mimic the venomous ones, and some even display various intimidating defensive behaviours. In such cases, if such harmless snakes are not rescued immediately by a trained rescuer, they may also be at high risk of being killed in retaliatory action by humans or out of fear.

Snakebite affects more humans than many other 'neglected tropical diseases' and often causes death, disability or disfigurement. At the global scale, the World Health Organization (WHO) has included snakebite as a neglected tropical disease. WHO's global strategy emphasises a combination of approaches, such as empowerment and engagement of communities, improved access to modern health facilities and better cooperation and coordination among stakeholders at the local, regional and national levels.

Challenges in mitigating HSC are more complex than any other species-in-conflict. With the enormous increase in the human population, coupled with habitat loss and habitat degradation, the frequency of human-snake interactions has also increased rapidly.

3. AWARENESS MEASURES TO PREVENT ACCIDENTAL ENCOUNTERS AND TO REDUCE RETALIATORY OR PREVENTIVE KILLING OF SNAKES

Educating people and increasing awareness about snakes and snakebites is one of the major pillars of HSC mitigation efforts, as considering the frequent negative interactions of snakes with livestock and humans, a general public perception of snakes is that they are 'vicious, dangerous and unwanted' wild animals. In such a situation, it is important that their conservation and management be based on a greater understanding of human perception about snakes, snake behaviour and life history parameters in general and of the causes of HSC in particular. Only through such education and awareness creation will the public reconcile themselves to sharing their space with snakes in a mutually beneficial way.

Local public engagement is a vital aspect of an HSC mitigation programme. In the multi-tier collaborative initiative (from the grassroots level to the panchayat and SFD levels), humans (farmers, students, medical professionals) are important stakeholders.

- In natural habitats that are surrounded by rural and natural resource-dependent human populations, the HSC problem is compounded. With humans whose livelihoods are dependent on sharing the habitat and its resources with snakes, HSC is an inevitable and unavoidable consequence. Circumstances in which humans or their livestock might directly encounter a snake may be clearly communicated to people living in such habitat so that such encounters are minimised or avoided.
- Media reports portraying snakes in a negative image are detrimental to their conservation and to effective management of HSC. Therefore, the education and awareness measures may also be extended to the media personnel, and every effort may be made to facilitate them in developing a common understanding of the key HSC issues and mitigation measures.
- Reader-friendly signage, pamphlets, posters and other educational outreach material containing snake photographs, written in the vernacular languages of the region, may be developed and distributed.
- Specific programmes on raising awareness on snakes behaviour and their roles in ecosystems, snakebite management (including snakebite-

related first-aid measures and treatments) may be implemented for farmers, other farm workers, women's groups, school and college students, and other such vulnerable groups may be conducted on a regular basis.

- Such awareness programmes may focus on raising the awareness of the public about snakes and snakebite avoidance and safety in areas where venomous snakes occur, through appropriate awareness and communication measures, including the following.
 - At the community level, snakebite first-aid kits and snake awareness material with clear pictures of common snakes found in the locality and highlighting coexistence principles can be provided to village-level community centres.
 - Periodic awareness programmes may be conducted by involving accredited snake rescuers.
 - Identifying persons as snake rescuers and providing them with snake rescue kits may also help reduce the conflict at the village or community level.
- Specific awareness measures and training in snake identification and snakebite management for frontline health workers and health sector professionals, healthcare professionals and paramedical staff members working in PHCs and government hospitals may be organised on a regular basis.
- The community engagement may also include measures to ensure that effective traditional practices that are wildlife-friendly are further enhanced, while unethical and unscientific practices are discontinued and discouraged. Traditional healers may be sensitised about the consequences of delayed treatment of snakebite.
- In areas where snake rescue programmes are not operational, snakes may be killed in preventive killing by humans, irrespective of the species. Hence, by intensifying awareness measures, coupled with the enhanced capacity of the field response teams involved in rescue operations, preventive killing of snakes may be reduced.

- Efforts may be made to integrate awareness material in the overall training curriculum of the *Krishi Vigyan Kendras* (KVK), State Institute of Rural Development (SIRD) and Panchayati Raj Institution (PRI).
- Awareness programmes may be implemented in and around protected areas and zoos in coordination and collaboration with the Ministry of Health and Family Welfare and the respective state health departments.
- Use of mobile applications may be promoted to strengthen the publicly available information on snakes.
- Identification manuals may be developed to facilitate people in correctly identifying snake species.
- Awareness material on snakes in regional and local languages may be developed and distributed by the SFD with the help of experts and snake rescuers. Such material can be distributed at public gatherings at taluk, block and sub-division headquarters, PHCs, CHCs and other hospitals. Biodiversity Management Committees (BMCs) at local levels may also include primary health workers like accredited social health activists (ASHAs), auxiliary nurse midwives (ANMs) in the committee.
- Books and radio and television talks by experts can be extensively used to spread positive awareness messages about snakes. Information communication technology (ICT) tools can also be used.
- Snake encounters can happen at odd times. In such cases, help from a trained snake rescuer is vital in locating the snakes, rescuing them, releasing them into their natural habitats and, most importantly, creating awareness among the gathered public about the snakes.
- Snake encounters may be reduced to a large extent by taking measures such as sealing door gaps and drainage outlets, clearing campus premises and packing up holes and burrows made by rats and termites, getting rid of rodents and toads from houses, etc. In villages, firewood and cow-dung piles can be stored outside houses, and care and caution may be taken when extracting material from them for use. Fine wire-meshes on windows are very useful in keeping out snakes. The use of mosquito nets is a must for humans sleeping in tents, on the ground, etc. Frequently used roads and paths may be adequately lighted. Torch lights may be used when going out at night, especially dirt roads and mud paths. Farmers may take precautions during crop harvesting. During winter or on cold days, snakes can be spotted basking in the sun on stone paths and tar roads, at warm spots inside houses, in warehouses/godowns/storehouses and in other snake-friendly areas.
- Mobile phone-based apps are very useful for reaching out to the urban public. Such apps can guide snakebite victims or their helpers to proper emergency procedures and treatment and can help save precious lives. This will not only provide access to urgent advice from experts on the treatment protocol but also consolidate data on snakebites into one platform. However not all victims go to hospitals, even in urban areas. Hence it is important to initiate community-based studies to get an accurate picture of snakebites and the morbidity and mortality involved so that proper treatment and management of snakebites can be achieved. Such mobile apps can help strengthen the information on snakes and help identify different species of snake.

4. STRENGTHENING THE ROLE OF KEY STAKEHOLDERS AND FACILITATING CROSS-SECTOR COOPERATION

The role of the key actors, viz., the SFDs, the district administration, the Panchayati Raj Institutions and the Medical/Healthcare Department, is critical in effectively addressing HSC.

- SFDs—relating to snakes (wildlife): deal with the actual animals involved in HSC
- District administration/Panchayat Raj Institutions—relating to humans: deal with the persons involved in HSC, community PRTs
- Healthcare professionals—relating to treatment: deal with managing and treating snakebites (government hospitals, private hospitals, PHCs)
- Effective coordinate on HSC among these actors though the District-level Coordination Committees (DLCCs) may be facilitated.
- A database of hospitals may be developed, with their contact details and locations, on a GIS map, and this may be made available to the public, through various media/publications, by the respective SFD and district administration. This database may be regularly updated.
- PHCs may strengthen their snakebite treatment facilities (polyvalent snake antivenin serum (PASV), ventilators, etc.). As a safety measure, the PHCs and CHCs may keep an adequate, steadily replenished stock of snake anti-venom and other necessary drugs (to control anaphylactic, pyrogenic and serum sickness reactions) for use during any emergency.
- The SFD offices may maintain up-to-date information on the availability of anti-venom within their jurisdictions.
- Other key stakeholders such as the local community, academic institutions, panchayat members, snake rescuers and the medical staff may be engaged effectively. When required, support from law enforcement departments and disaster management teams may be availed of through the local administration.
- New real estate sites often cause habitat destruction for snakes, mainly through digging and earth-moving activities. In this regard, advisories should be developed by the SFD for such sites to compensate the habitat loss to wildlife caused by such activities. The advisories should be science-based and technically supported by data on the presence of local wildlife species. SFDs can establish an advisory group of local institutions, NGOs and experts for such technical support in specific divisions/landscapes where such cases are frequent.

5. SYSTEMATIC RESEARCH AND MONITORING FOR HSC MITIGATION

While snakes are among the most common predators in ecosystems, they also serve as important prey in the same ecosystems. These characteristics have led to the evolution of interaction patterns between snakes and other prey species. Studies on the above-mentioned aspect have not yet carried out in India except for two radio-telemetry studies on the king cobra conducted recently by the Agumbe Rainforest Research Station (ARRS) and a telemetry study on the Indian rock python conducted by the Wildlife Institute of India (WII) in the Moyar River Valley, Tamil Nadu. These studies have provided insights into snake biology in the country.

Snake rescue activities provide ample opportunities for scientific studies and population monitoring. Crucial information on the distribution of snakes and on the natural history, basic biology and ecology of species can be generated by systematically documenting each case.

- Case studies pertaining to size, sex, biological condition and weight of species; feeding habit and food spectrum; rescue techniques and preventive measures; and frequency of recapture of marked individuals are examples of some of the parameters that can be obtained from the rescue operations. Eventually these can provide a deeper understanding of the drivers of the conflict.
- The presence of abundant prey species (i.e., rodents, amphibians and poultry species) around human habitations and agricultural fields attracts snakes to such areas. This makes human–snake encounters inevitable.
- It is imperative to know the behavioural changes in rescued snakes once they are released to a new environment that may lead to conflicting situations.
- Studies are also important to understand the dynamics of snake–human conflict, and data gathered by the rescuers and SFD may be analysed to find out site-specific drivers of conflicts.
- Large snakes sharing similar niches face a high degree of competition, and hence areas naturally inhabited by one species (for example the rat snake) have a very low density of the other species (for example, the cobra) and vice versa. Furthermore, removal of one species may result in immigration of other species. Hence, inter and intra-species competitions in snakes need a deeper understanding

to predict HSC in a particular area.

- It has been recently established by a study that there is regional variation in the venom composition of a particular species. Hence, scientific research into the structure and composition of venom in the regional context is very important. Out of Big Four, if two (saw-scaled and Russell's viper) are not present in the region, production of bivalent anti snake venom to cover neurotoxic bites of cobras and kraits can be considered. It is important to recognise the regional issues in snakebite and its management.
- Each division may facilitate volunteers and researchers to gather first-hand field data on the distribution of snake species in their respective areas, with support from key stakeholders, as follows:
 - Experts from local universities/colleges may be engaged once a year to survey the areas that have some degree of vegetation cover, e.g., near lakes/water bodies, hillocks, social forestry (SF) zones, cultivated lands and farmland, to generate or update local inventories of snakes and also to identify suitable release sites.
 - Range RRTs may conduct road-cruising surveys at night, especially during the monsoon, to inventory the snake species present, to quantify wildlife loss due to anthropogenic factors and to map HSC hotspots.
 - Local hospitals may be facilitated to collect data on the status and prevalence of snakebite cases, on the availability and stock of snake anti-venom. They may also be facilitated to convey these details to local HWC Mitigation Hubs on a regular basis.
- Experts and institutions may be facilitated to develop and use the mobile applications on collecting snake distribution data, and HSC maps can be generated from the rescue reports that are stored in the mobile apps. The apps may be designed to provide a digital guide about the species found in each region on the basis of the GPS location of the user's device. There may be a provision in the app to share images with other users for identification of a snake species. Sharing of the data with the Health Department data repository may be facilitated.

- Experts and institutions may be engaged to identify release sites for rescued snakes of key species in the area. The IUCN release protocols may be used as the guidelines for identifying such release sites. This research may facilitate a change in the current practice of releasing large numbers of rescued snakes at a single location to a more scientific release protocol, on based on species and habitat studies.
- Experts and institutions may be facilitated in monitoring potential release sites. Such sites may be demarcated for long-term monitoring of snake species. Ecological information (availability of hideouts/shelters, prey base, cover, water sources, carrying capacity, presence and abundance of various snake species, etc.) may be studied to designate an ideal relocation site. There may be adequate vegetation cover in and around release sites to cushion a snake's shock of release into a new, unfamiliar location. This may ensure that snakes do not stray out from release sites immediately after release, back into human settlements, in search of their basic life requirements. Researchers/biologists may be engaged along with the front-line staff (watchers, guards and foresters) in conducting an annual vegetation cover evaluation in such release sites.
- **Identifying conflict hotspots⁵** (which could also provide a direction towards the drivers of conflict) is critical to provide site-specific solutions to mitigate HSC. HSC conflict hotspots may be mapped through geospatial assessments, by using both primary data and secondary data, including time-series data. Hotspots can be identified and mapped as follows.
 - Incident hotspot: Frequency of occurrence of incidences over a specific period in the past, such as 5 or 10 years, mapped over the target area. The data include the number of incidences of injury and death and crop and property damage.
 - Vulnerability hotspot: Cumulative index determined by overlaying past incidents, the vulnerability of the local community and the potential risk of the area.
- The field data gathered by the snake rescuers may be used for generating such hotspot maps, apart from the data collected through the mobile applications.

6. SNAKE-VENOM COLLECTION

- It is up to a State's CWW under S-12 (d) of WPA (1972) to grant permission (on payment of stipulated fees), by an order in writing, stating the reasons, to any person to hunt any wild animal (in this case, snakes), subject to conditions for the purpose of deriving, collection and preparation of snake venom for the manufacture of life-saving drugs, with the permission of the Central Government for Schedule I species and of the State Government for any other wild animals (schedule II-IV). The number and species of snakes to be captured, quantity of venom to be extracted, geographical area, period and snake rehabilitation are to be specified in the order.
- The holder of the permit needs to submit periodical reports detailing the number of snakes captured and the quantity of venom extracted and supplied to institutions producing anti-venom drugs. The designated field officers may also undertake periodic inspection to ensure that trauma is not caused to the snakes during the capture and release operations and that the snakes are rehabilitated in the same habitat from where they were captured⁶.
- Funds provided by the Ministry of Health and Family welfare, through the National Free Drug Initiative, for the implementation of Prevention and Control of Snake Bite Envenoming in India, under the National Health Mission, can be used for the measures to be taken towards this.

5 'HWC hotspots' are areas with actual or predicted repeated occurrences of HWC incidents resulting in crop-loss, livestock death, human death and injury and wildlife death and injury over temporal and spatial scales. The HWC can be static (repeated at the same place or time) or dynamic (shifting in space over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

6 The Irula tribe's snake catcher cooperative society in Tamil Nadu are traditional snake catchers and are involved in the extraction of snake venom to meet their livelihood needs, and after venom extraction, the snakes are monitored and rehabilitated as per the protocols.

7. FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HSC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

Capacity development of SFDs, other line departments, local communities and all key stakeholders may be facilitated to ensure that a holistic approach is adopted:

- The SFDs may ensure that all response team personnel from the forest department and other line departments and agencies are brought under a systematic approach to capacity development, in line with the Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams⁷.
- It may be valuable to establish a division-level honorary working group of professional herpetologists to support the response teams, on a case-to-case basis. This working group may also facilitate training programmes and other capacity development measures, such as mentoring and coaching the snake-experts in the response teams in the following aspects.
 - Supporting the SFD in identifying snake species (region-specific) and developing a pocket-book/ identification guide in the local language, along with a matching mobile app to facilitate response team members and general public in identifying snakes
 - Supporting the SFD in identifying potential snake microhabitats or niches, both in wild and humanized habitats
 - Supporting the SFD in the handling (capture and restraint) of live snakes, including the venomous ones
 - Supporting the SFD in developing short-term housing/shelters for such rescued snakes (when necessary)
 - Supporting the SFD in transportation of live snakes for bona fide reasons (from the capture site to a release site or to a veterinary clinic)
 - Supporting the SFD in identifying potential release sites on the basis of the distance from the site of capture, the extent of vegetation spread, the species of snake involved and the proximity of the targeted release site to human settlements
 - Supporting the SFD in liaising with veterinarians keeping in mind the possibilities that the snakes are wounded or injured during or prior to the initial capture
- In each forest division and range, there may be a need to identify the forest department staff and other volunteers from rural and urban areas who are interested in snake capture, rescue and rehabilitation. They may be imparted training to develop knowledge and skill to perform snake handling and rescue operations.
- Training of health workers to diagnose and carry out preliminary snake treatment measures may be essential. Training of the first-aid and ambulance personnel to stabilise and safely transport snakebite victims to a hospital is very important in saving the life of the victim.

⁷ Supplementary framework to HWC-NAP on establishment and capacity development of HWC mitigation response teams: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

8. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HSC

8.1 OVERALL MEASURES

- Emergency or crisis situations can be defined as situations that are sudden, unexpected, have the potential to be serious (or are serious) in nature and therefore require immediate intervention in time and space, from concerned stakeholders, to minimise loss of lives and assets. In the present context, these would be situations that involve snakes in a position where any interaction can be potentially injurious or fatal to either humans or the snakes.
- An indicative list of the potential emergency situations on a priority basis is as follows:
 - i. Snakes taking shelter in a human habitation in case of floods
 - ii. Livestock/poultry bitten by a venomous snake
 - iii. Rescue of injured snakes
 - iv. Snakes entering human-use areas (agricultural fields or settlements)
 - v. A human has been killed/injured due to snakebite
 - vi. Snake death due to retaliatory action
- Key response procedures may be established and actions promptly implemented/undertaken for addressing emergency situations.
- A robust mechanism to promptly trigger the emergency response may be established at each forest division right from early detection of the incident to communication with key officials and information dissemination for initiation of appropriate response actions at the site of the incident. To ensure the safety of the humans and snakes involved in this interaction, a planned response is required.
- The snake emergency situations may happen very frequently throughout the year, and may be highest during the monsoon, with a reduction in the interaction during winter. They need to be dealt with through safety measures of the highest level, especially in case of a venomous species. During flood-like situations, the help of disaster management teams may be availed to reach out to humans and snakes in distress.
- Snake rescue is a process fraught with dangers, for both the rescuer and the snake itself. Although a snake's rescue may happen at 'odd times' (outside the natural activity period of a species), its natural

activity and habitat requirements are to be taken in to consideration when relocating and releasing the animal. For example, if a Russell's viper is rescued during the daytime, it has to be released in its appropriate habitat only during nighttime. Hence, it becomes necessary for the rescuers to have a basic understanding about the ecology, behaviour, habitat and prey of snakes. The training programme should provide specialised information about the snakes that are found in that area and its habitat. The most frequently rescued snakes include cobras, rat snakes and checkered keelbacks.

8.2 REDUCING THE IMPACT OF HSC ON THE HEALTH AND WELL-BEING OF THE HUMANS

8.2.1. Overall measures

- A majority of snakebite victims die unnatural deaths due to delayed access to well-equipped hospitals or unnecessary wastage of time in faith healing treatments or quackery. To prevent this, effective awareness and popularisation of government schemes for snakebite cases may help reduce the high mortality from snakebites and help the overall well-being of the humans.
- Venomous snakes may not be released in thickly populated areas. They may be released in designated or suitable habitats with the minimum possibility of human encounters, where they can survive after release. Such habitats may be identified and adequate warning signage put up to indicate the heightened presence of venomous snakes in the area.
- The SFD may assist and facilitate various measures, including any ex gratia payment, according to the state-specific rules by coordinating with hospitals and the district administration.
- Snake rescue is a professional task that involves higher levels of risk. A venomous snake's bite could be fatal or could cause severe damage to the rescuer's body. In many remote parts of the country, the treatment for a venomous snakebite might not be available within easy reach. In such zones, extra care may be taken by the rescuers when involved in rescue operations.

- Improving medical facilities at Primary Health Centres (PHCs) and Community Health Centres (CHCs), as well as improved ambulance services, may prevent snakebite deaths in such risk zones.
- Awareness of the availability of emergency treatment facilities for snakebites in government and private hospitals and of the availability of ex gratia payments in any government schemes or relief funds may be imparted to the communities.
- HSC equipment inventory development in the corresponding Divisional Forest Officer's (DFO) headquarters and in the subordinate offices may also be necessary. This involves stocking adequate equipment such as snake hooks, snake bags, safety boots and a region-specific pocket-guide/photo-album or manual for snake identification.

8.2.2. Addressing zoonotic and other emerging diseases, taking a One Health approach

- Snakebite envenoming is a neglected tropical disease (NTD) with a significant public health impact. The most vulnerable populations are those populations where the presence of venomous snakes overlaps with a lack of access to healthcare and effective treatment. Other than the venomous snakes, many harmless snakes also possess microbes and may act as vectors. Snakes live in habitats where various bacterial strains also exist. During handling of snakes or during snakebites, the oral microflora of the snakes may infect the bite victims. Pathogenic organisms carried by snakes greatly vary with species, season and geographical location. Usually, the relationship between snakebite and microbial infection is neglected during the treatment process. Hence, snake rescuers, the public and medical practitioners should be made aware of zoonotic diseases that may be transmitted due to snakebites.
- The following measures are envisaged at HSC hotspots:
 - Veterinary capacities and infrastructure may be upgraded to facilitate disease monitoring in wildlife populations for both wildlife conservation and prevention of zoonotic diseases in human populations.
 - A well formulated Wildlife Health Management & Disease Surveillance Plan may be in place at every division/PA.
 - All personnel involved in capture operations may be trained, vaccinated and equipped.

- HSC mitigation and snake rescue training may involve the respective state health department, and the standard treatment guidelines and snakebite (STG) guidelines developed by the Ministry of Health & Family Welfare may be followed.

The basic approach should be to integrate the concept of One Health⁸, which links human and animal health in a shared environment, into all the operations and HSC mitigation measures in the field.

8.3 REDUCING THE IMPACT OF HSC ON THE HEALTH AND WELL-BEING OF THE SNAKES

- Cruelty in handling wild animals such as snakes, careless transportation, unduly long possession and releasing snakes anywhere randomly without considering the basic requirements of the species are some of the common practices that are detrimental to the animals.
- Public displays, stunts with rescued snakes, illegal use of snakes for any other purpose and misuse of a permission for anything other than for rescue and relocation are to be treated as violations of WPA (1972).
- Rescuers who try to remove a snake from what is now its natural habitat should consider the unforeseen impacts on the micro-ecosystem due to the sudden and complete removal of a species.
- During the process of capture and translocation, the minimum trauma is to be caused to the snake. The person to whom the permission to hunt (capture and translocate) has been granted should ensure that the snake is not pushed into its burrow as this will cause injury and trauma to the snake.
- Rescue operations involve both cost and time. Hence sensitising humans to coexist with non-venomous snakes can prevent unnecessary rescue operations. The awareness of the community regarding the identification of snakes, necessary precautions to avoid snakebites and steps to be taken in case of snakebites are important in dealing with future situations better.
- If any exotic species of snake is sighted or rescued by a snake rescuer, this should be immediately brought to the notice of the concerned DFO. The snake needs to be captured and maintained in captivity.

⁸ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

- Non-venomous snakes should be released within their current home ranges. If an earmarked site is not available for the release, then a suitable habitat similar to the current habitat may be selected for the release.

8.4 EFFECTIVE USE OF EARLY WARNING AND RAPID RESPONSE SYSTEM AT HSC HOTSPOTS

Conventional early warning systems, as used for other species-in-conflict, are not usually warranted for snakes. The response system, however, may be strengthened in each division with a high level of HSC.

- The response teams may be trained in snake rescue operations. In addition to this, at HSC hotspots, a dedicated set of competent staff members, from the RRT personnel, may be specially trained in mitigating

HSC, including snake rescue operations, and provided with certificates at the end of the training for assisting with rescue operation.

- Volunteers may also be trained and engaged on a contractual basis, according to the feasibility, by the forest department during rescue operations.
- The RRTs may be trained for preventing HSC during floods and post-flood situations when snake encounters become numerous as lots of snakes are washed downstream and take shelter in human habitations for shelter and warmth.

9. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK ON HEALTH EMERGENCIES IN HWC SITUATIONS IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place by the DLCCs and state-level Coordination Committees (SLCCs) to document the feedback generated by the implementation of these guidelines.

- The feedback may, therefore, be consolidated to form the basis for fine-tuning the HSC mitigation measures and understanding the capacity needs for effectively implementing the inter-agency coordination mechanism and taking a One Health approach.

- In the long term, the consolidated feedback should also be used in further revision/updating of the capacity development strategies, Division-Level HWC Management Action Plans and national and state HWC Strategy and Action Plans.
- Feedback from the inter-agency teams will be used to further strengthen our understanding of the operationalisation of the One Health approach.

10. PROCESS OF DEVELOPMENT AND PILOT TESTING OF THESE GUIDELINES AND THE CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives of government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, public health experts, medical professionals, veterinary experts, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology⁹ 10. The experts had different roles in the drafting and editing process, viz., as Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from the MoEF&CC, WII and GIZ and independent wildlife

and policy experts, was formed for the overall steering and facilitation of the process. The Working Group on Pilot Implementation of Guidelines and HWC-NAP was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot-tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A committee was constituted by the MoEF&CC in December 2022, consisting of officials from the MoEF&CC and the SFDs of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal to review and finalise the guidelines.

11. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years from 2023

onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- A detailed mechanism, templates and guidance used for collating information and feedback relating to the use of these guidelines may be developed.

⁹ Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

¹⁰ Human-Wildlife Conflict Mitigation Instrument-Strengthening Capacities to Address the issues related to zoonotic and other emerging diseases: Taking a One Health Approach publication02-06-2022-1654169065.pdf (indo-germanbiodiversity.com)

ANNEXE 1

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Guidelines for Mitigating Human–Crocodile Conflict

Taking a Harmonious–Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Mitigating Human–Crocodile Conflict

Taking a Harmonious–Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	IUCN	International Union for Conservation of Nature
CWLW	Chief Wildlife Warden	JFM	Joint forest management
CZA	Central Zoo Authority	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
DBT	Direct Benefit Transfer	NDRF	National Disaster Response Force
DFO	Divisional Forest Officer	NGO	Non-governmental organization
DLCC	District-Level Coordination Committee	NTCA	National Tiger Conservation Authority
DNA	Deoxyribonucleic acid	NTG	National Technical Group
EIA	Environmental impact assessment	NWAP	National Wildlife Action Plan
EWRR	Early Warning and Rapid Response	OPs	Operating procedures
GIS	Geographical information system	PA	Protected area
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	PCCF	Principal Chief Conservator of Forest
Gol	Government of India	PPE	Personal protective equipment
HCC	Human–Crocodile conflict	PRT	Primary Response Team
HOFF	Head of Forest Force (in a state)	RFID	Radio frequency identification
HWC	Human–wildlife conflict	RRT	Rapid Response Team
HWC-MAP	Human–Wildlife Conflict Management Action Plan	SDRF	State Disaster Response Force
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SFD	State forest department
HWC-SAP	State-Level HWC Mitigation Strategy and Action Plan	SHG	Self-help group
IFS	Indian Forest Service	SLCC	State-Level Coordination Committee
		SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Acknowledgments	ii
1. About the Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	6
1.4 Legal and Policy Framework for Implementing the Guidelines	6
1.5 Institutional Mechanism for Implementing These Guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of HCC	8
3.1 Zonation	8
3.2 Monitoring and Managing Habitat-Related Drivers and Pressures	8
3.3 Reduce Livelihood Dependence of People on Crocodile Habitats	9
3.4 Measures to Strengthen Cross-sector Cooperation for Effective HCC Mitigation	9
3.5 Community Awareness and Communication Measures to Reduce the Risk of Accidental Encounters and Retaliation	10
3.6 Effective Garbage Management and Safe Sanitation in and around HCC Hotspots	10
3.7 Systematic Research and Monitoring Addressing HCC	10
3.8 Measures to Strengthen the System of Knowledge Management in HCC Mitigation	11
3.9 Measures to Strengthen the Role of Key Stakeholders and Cross-sector and Inter-agency Cooperation for HCC Mitigation	11
3.10 Facilitating Capacity Development Measures to Develop the Required Competencies for Addressing HCC in the most Effective and Efficient Manner	11
4. Deploying Measures to Prevent Human–Crocodile Conflicts	12
4.1 Identification of Hotspots of HCC	12
4.2 Effective Use of Early Warning and Rapid Response Systems at HCC Hotspots	12
4.3 Monitor and Document ‘Potential Crocodiles-in-Conflict’ in the Landscape	13
4.4 Support Local Population in Preventing Accidental Encounters with Crocodiles	13
4.5 Support the Local Community in Using Barriers and Other Exclusionary Measures, Taking a Harmonious-Coexistence Approach	14
4.6 Addressing High-Conflict Crocodile Individuals	14
4.7 Addressing Zoonotic and Other Emerging Diseases, Taking a One Health Approach	14
5. Addressing the Emergency Situations Arising due to HCC	15
5.1 Establishing an Emergency Response Mechanism	15
5.2 Intra- and Inter-agency Coordination and Cooperation	15
5.3 Preparedness of Response Teams	15
5.4 Action at the Onset of Emergencies or Specific Situations	15
6. Reducing the Impact of HWC on the Health and Overall Well-being of Affected People	17
6.1 Addressing Loss of Human Life and Injury	17
6.2 Addressing Loss of Livestock	17
7. Reducing the Impact of HCC on the Health and Well-being of Affected Crocodiles	18
7.1 Capture and Handling of Crocodiles	18
7.2 Release Essentials	19
7.3 Rehabilitation of Captured Crocodiles	19
7.4 Radio Collaring or Tagging (RFID-Microchip) Captured Crocodiles	19
8. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework Related to HCC Mitigation in India	20
9. Process of Development, Pilot-Testing of These Guidelines and Consultation Process	20
10. Monitoring and Evaluation of Guidelines	20
Annexe 1	21
National Technical Group (NTG)	21
Working Group on Pilot Implementation of Guidelines and HWC-NAP	21
Author Group for drafting the guidelines	21

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on human–crocodile conflict (HCC) mitigation get the overall context from the Wild Life (Protection) Act, 1972 (WLPA), the National Wildlife Action Plan (2017-31)¹, the Advisory to Deal with Human–Wildlife Conflicts (MoEF&CC 2021) and the National Human–Wildlife Conflict Mitigation Strategy and Action Plan of India (2021–26) (HWC-NAP)² provides the overall conceptual and institutional framework for implementing these guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good practice documents issued by various state governments and build on them to bring about a more holistic approach to HCC mitigation.
- In addition to HCC mitigation, the following species-specific guidelines are being developed: guidelines for mitigating human–Elephant, –Gaur, –Snake, –Rhesus Macaque, –Wild Pig, –Bear, –Blue Bull, –Leopard and –Blackbuck conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HCC in India, leading to co-existence, and to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and crocodiles.
- The guidelines provide advice on mitigation measures to be used to address HCC in the long term as well as facilitate the development, assessment, customisation and evaluation of site-specific HCC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HCC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HCC mitigation and are not limited to state forest departments (SFDs).
- The guidelines will be able to bring in more effectiveness and efficiency when they are fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.3 APPROACH

- The development of these guidelines is driven by a harmonious-coexistence approach³ to ensure that both humans and crocodiles are protected from negative impacts of HCC.
- The guidelines adopt a holistic approach in addressing the issue of HCC. The holistic approach of the guidelines entails addressing not only the emergency situations arising due to immediate conflict situations but also the drivers and pressures that lead to HCC; providing guidance on establishing and managing prevention methods; and reducing the impact of conflict on both humans and crocodiles.
- The development of these guidelines and their intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HCC mitigation measures with key sectors and stakeholders at the national, state and local levels.
- The guidelines reflect on the need for a landscape approach while formulating solutions for mitigating HCC to ensure sustainable solutions as unless comprehensive and integrated HCC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementation through provision of *Implementer's Toolkit*, which includes Operating Procedures (OPs), formats, checklists, and other field implementation aids..

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act, 1972.
- The following laws are considered directly relevant for conservation when dealing with HCC:
 - Wild Life (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Other important legislations that facilitate conservation when dealing with HCC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Biological Diversity Act, 2002, the Environment (Protection) Act, 1986; and Disaster Management Act, 2005.
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HCC.
- The *Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India*⁴ is to be referred to for more details on the specific legal provisions relating to HWC mitigation.

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTING THESE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed in implementing these guidelines.

1 MoEFCC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021–26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human–wildlife interactions on humans or on their resources and on the wildlife or on habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

4 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2. CONTEXT AND SITUATION

- Crocodiles are aquatic species inhabiting freshwater, brackish water and marine ecosystems. There are about 23 species of crocodile in the world. Of these, three species, namely, the Gharial (*Gavialis gangeticus*), Saltwater Crocodile (*Crocodylus porosus*) and Mugger (*Crocodylus palustris*), occur in India.
- Though aquatic, they also require the adjoining terrestrial areas (shores and banks) of water bodies for meeting their regular basking (thermoregulatory) and seasonal breeding requirements, for example, for making a nest in the ground by the Mugger and Gharial, and a vegetation mound by Saltwater Crocodile.
- Crocodiles play a key role in aquatic ecosystems as top predators and maintain the aquatic ecology and healthy balanced ecosystems. Because of their specialized habitat needs in terms of habitat characteristics and water chemistry, they are also excellent indicators of aquatic biodiversity.
- ‘Human–crocodile conflict’ (HCC) refers to negative interactions between people and crocodiles, leading to negative impacts on people or their resources, such as human death and injury, loss of livelihoods and impacts on the emotional well-being of humans, and on the crocodiles or their habitats
- People and crocodiles have co-existed and have shared a long history of living together, in some cases for millennia, without much conflict. However, with increased human activities in crocodile habitats as well as the spillover of crocodile populations, as a result of conservation efforts, HCC has been escalating in many areas. There has been an increase in the number of human fatalities over the last few years in India due to HCC.
- HCC involves two species of crocodile, viz., saltwater crocodile and Mugger, with key impacts on humans in the form of human injury and death, livestock injury and death. HCC is a serious issues in rural and semi-rural environment.
- Human–crocodile conflict is reported from seven states (Odisha, West Bengal, Andaman and Nicobar Islands, Gujarat, Maharashtra, Karnataka and Tamil Nadu).
- The drivers of HCC include an increase in the human population close to crocodile habitats, changing lifestyles and economic aspirations; reduced appreciation of wildlife; land-use changes; tourism policies; aquaculture; fishing; and wetland habitat fragmentation, loss and degradation.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HCC

The HWC-NAP recommends a holistic approach to HWC mitigation in which the thematic triangle of drivers–prevention–damage mitigation is considered and addressed. These guidelines have been prepared in line with the recommended holistic approach to bridge the current gap.

A major gap involves effective problem analysis to identify drivers and pressures of conflict. Such analysis allows selection of mitigation measures appropriately.

- An assessment of long-term outcomes and implications of all mitigation methods is needed to identify effective and wildlife-friendly mitigation measures to address HCC. For this, a systematic analysis of HCC mitigation methods may be performed to assess their effectiveness and wildlife-friendliness in different types of conflict situations. This will facilitate the customisation and adoption of mitigation measures necessary to achieve the best possible impacts in the field.
- Cross-sectoral cooperation is critical for addressing drivers of conflict through improved land-use planning and other measures and to customise the mitigation measures.

3.1 ZONATION

- The crocodile habitat should be differentiated into two management zones for achieving the varied objectives of the species management required by various HCC mitigation measures. Zonation is a management tool for implementing a science-based and pragmatic approach to landscape-level planning for conservation and HCC mitigation.

1. Crocodile Conservation Zone (CCZ)

- Crocodile Conservation Zones are protected habitats where conservation takes priority over any other management objectives and mainly include protected areas (PAs) and other critical crocodile habitats. These zones are free of human disturbance (fishing, aquaculture, cultivation, washing and bathing, removal of biomass from forests). If some human dependency exists at the interface, it is to be resolved as per the provisions of the Wild Life (Protection) Act, 1972 and the Indian Forest Act, 1927.

2. Human–Crocodile Interface Zone (HCIZ)

- This zone includes the multiple-use areas in which a crocodile habitat has an interface with a human-use area where resource extraction by the communities is permitted and there is a likelihood of chance encounters of humans and crocodiles. The cardinal principles of HWC pertaining to mutual coexistence, participatory conflict management and holistic approach should prevail. This zone also comprises areas that are important for the livelihoods of local communities and activities such as fishing, aquaculture and tourism, which are the main sources of the local economy. Therefore, this zone may be kept relatively free of crocodiles so that the local economy or livelihoods are not affected. The crocodiles in these areas may be captured and translocated to other suitable habitats or to rescue centres if required.
- The state forest department may identify and classify the above-mentioned zones on the basis of crocodile occupancy, proximity to human habitations, frequency and intensity of conflicts, fishing rights and possible inclusion in tourism zones.

3.2 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

When a crocodile habitat overlaps with human-use and -dependency areas, there are great implications for humans and crocodiles. These can be resolved through a holistic management strategy. Monitoring and understanding the factors and causes leading to the increase in human population, land-use changes, fishing, aquaculture and habitat fragmentation, loss and degradation are crucial in mitigating HCC. The following assessments are envisaged:

- Mapping of existing drivers and pressures of conflict such as land-use change by conversion of wetlands and crocodile habitats/mangroves/forest into agricultural lands, fishing, encroachment, mining, aquaculture, settlements within forests and resource use by local communities.
- Ensuring that all forest boundaries, lakes and river banks are patrolled on a regular basis for preventing encroachments and degradation of habitats.

- Managing crocodile habitats in inland and coastal lakes that fall beyond the forest boundaries requires regular assessment to generate time-series data:
 - Mapping of crocodile occupancy, distribution and numbers in habitats, especially areas of intense human use
 - Mapping land tenure and identification of key stakeholders
 - Holding consultations with local communities to facilitate crocodile conservation
 - Engaging various line departments who can facilitate the enhancement or improvement of livelihood options that reduce the extent and intensity of use of crocodile-occupancy areas
 - Facilitating capacity development of other line departments, local communities and other key stakeholders
 - Preparing and implementing long term plans such as state-level human-wildlife conflict mitigation strategy and action plans (HWC-SAPs), and division-level HWC management action plans (HWC-MAPs) for conservation and conflict management within crocodile habitats
- State forest departments, through the Multi-stakeholder Fora at the state level and the Joint Working Groups with key departments and agencies at the landscape level, may develop synergies and facilitate integrated land-use planning and effective implementation of planned measures
- Mapping the extent of pollution in and around crocodile habitats caused by discharge of wastes and effluents from industries and aquaculture to assess the degradation of the waterscape and the resultant reduction in the quality of the habitat, which may require intensive amelioration measures and coordination with line departments

3.3 REDUCE LIVELIHOOD-DEPENDENCE OF PEOPLE ON CROCODILE HABITATS

Loss and degradation of habitat due to fishing, discharge of effluents and toxic waste, unsustainable tourism, etc in aquatic environment, and conversion of aquatic habitats into agricultural lands or aquaculture wetlands or urbanization that affects the fresh water and marine aquatic species exacerbating the HCC.

A large part of the aquatic water bodies and coastal marine area and forests are used by communities living in proximity to the forest resulting in the removal of biomass

for use as food and fuel wood, unregulated fishing, dependence of livestock population on wetlands lands leading to degradation of the coastal and inland wetlands. Wetlands based resources are often an important source of cash income for the poor around.

Fishing, aquaculture, non-timber forest produce and forest rights facilitate subsistence livelihoods, and with the growing human population and deteriorating habitat quality, such livelihoods will become even more marginal and the people will be pushed further into poverty.

- The management interventions should focus on better livelihood opportunities through community participatory approaches, including various eco-development measures and livelihood improvement programmes.
- The enhancement of the quality of life of wetlands dependent communities can be assured through efficient participatory multiple-use management and equitable distribution of resources through the following mechanism and governance system:
 - integrated development and management of wetlands-based resources
 - ensuring institutional, financial and ecological sustainability
 - establishing accountability and transparency in management practices
 - creating an institutional mechanism for empowering local communities.

3.4 MEASURES TO STRENGTHEN CROSS-SECTOR COOPERATION FOR EFFECTIVE HCC MITIGATION

Cross-sectoral cooperation for HCC mitigation entails engaging multiple stakeholders from different sectors and domains at the national, state, landscape and district/forest division levels. The following measures are envisaged:

- State-Level Coordination Committees (SLCC), landscape-level multi-stakeholder fora and District-Level Coordination Committees (DLCC) may be used to strengthen the inter-agency coordination required for HCC, and a district-specific operational mechanism may be developed to address specific needs of HCC mitigation.

3.5 COMMUNITY AWARENESS AND COMMUNICATION MEASURES TO REDUCE THE RISK OF ACCIDENTAL ENCOUNTERS AND RETALIATION

To facilitate effective engagement of local communities and various stakeholders in mitigation of HCC, it is extremely important to plan and implement awareness and sensitisation measures, adopting a participatory approach.

- Appropriate community awareness and communication measures may be implemented at HCC hotspots, and their impacts may be assessed periodically to ensure that the awareness and communication measures are locally customised.
- Plan and implement training programmes and other capacity development measures and extension programmes with school and college students and engage with women's self-help groups, village forest committees (VFCs), eco-development committees (EDCs), Biodiversity Management Committees (BMCs), large area multipurpose societies (LAMPs), etc. The EDCs/VFCs formed by the state forest department in coastal areas and villages abutting the forest area in the zone of influence may be made functional and their sustainability ensured through accrual of benefits and incentives.
- Facilitate the participation of key stakeholders to ensure the integration of traditional and local knowledge and experiences into the development of division-level HWC-MAPs for crocodile conservation and developing measures for HCC mitigation.

3.6 EFFECTIVE GARBAGE MANAGEMENT AND SAFE SANITATION IN AND AROUND HCC HOTSPOTS

Garbage is known to attract crocodiles, especially organic waste from slaughterhouses/fish-processing units that is dumped near areas visited by humans, including tourist beaches and the vicinity of human habitations on coasts/creeks and banks. These dumps create a potential for accidental encounters between people and crocodiles.

The following are indicative measures to address the situation:

- Ensuring sustainable and ecologically sound waste and garbage disposal by town municipalities and village panchayats at the borders of crocodile habitats, especially at HCC hotspots.
- Tourism zones situated close to crocodile habitats should take measures to avoid conflict through proper disposal of garbage (dumped food items, particularly fish and offal), which attracts crocodiles.

- Periodic inspection of the forest–water interface area near villages/towns by SFDs and other government departments/organisations to ensure that poor disposal of organic garbage from fishing activities and slaughterhouses/fish-processing units is detected and brought to the notice of the local authorities. Volunteers can be engaged for this.
- Community awareness programmes and signage to facilitate effective participation by local communities in garbage management. Appropriate signage about garbage management and crocodile presence may be installed along roads and at the water–land interface. Periodic inspection of forest boundaries, lakes, river banks and estuaries may be carried out by SFDs and line departments.
- SFDs may also coordinate with municipalities/panchayats about garbage management and explore the possibility of building toilets under the Swachh Bharat Mission to prevent accidental encounters at HCC hotspots.

3.7 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HCC

Crocodiles are very shy, well-camouflaged and mobile, which makes them a challenge to study. Knowledge of the ecology, biology and behaviour of crocodiles helps us develop tools and strategies to conduct safe and efficient research on crocodiles.

State forest departments, research institutions, NGOs and experts involved in crocodile conservation are encouraged to carry out result-oriented research on the HCC status and mitigation measures. While some research and monitoring topics require specialised technology, knowledge and skills, much of the research and monitoring required for effective understanding of HCC should be conducted by the forest department staff themselves.

The following are some research priorities:

- Understanding the population density, distribution and spatio-temporal changes in the distribution and occupancy of the crocodiles in the habitat
- Studying communication in crocodiles will provide knowledge about deterrents that can be used to mitigate HCC.
- Studying movement ecology through telemetry and mapping and predicting the conflict probability within a habitat
- Studies on spatio-temporal movements towards organic waste will help devise crocodile separation barriers.

- Using innovative multi-beam sonar technology and image recognition software in zones with high levels of crocodile conflict to detect crocodiles and alert authorities to their presence. This technology can help deploy a Clever Buoy system for recording environmental data (temperature, wind, humidity) to determine when and why crocodiles move into areas frequented by people.
- State-level coordination committees (SLCC), landscape-level multi-stakeholder fora and district-level coordination committees (DLCC), may be used to strengthen the inter-agency coordination required for HCC, and a district-specific operational mechanism may be developed to address the specific needs of HCC mitigation.

3.8 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT IN HCC MITIGATION

To ensure effective and sustainable HCC mitigation measures, it is essential that field experiences, learnings, field-evidence and conceptual advances be not only shared with stakeholders across landscapes but also documented to be utilised in future strategies and plans related to HCC mitigation.

- A strong knowledge base on the territorial behaviour of crocodiles should be developed at each HCC hotspot.
- The National HWC Mitigation Forum, landscape-level multi-stakeholder fora and appropriate working groups should be used to share field experiences, learnings, evidence and conceptual advances within the forest department, with stakeholders and across landscapes.
- Measures are to be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances in HCC mitigation to inform the future strategies and plans with regard to HCC mitigation.

3.9 MEASURES TO STRENGTHEN THE ROLE OF KEY STAKEHOLDERS AND CROSS-SECTOR AND INTER-AGENCY COOPERATION FOR HCC MITIGATION

Cross-sectoral cooperation for HCC mitigation entails multiple stakeholders from different sectors and domains being engaged at the national, state, landscape and district/forest division levels. Key stakeholders for HCC mitigation may include the state forest department and other line departments, viz., Fisheries, Agriculture, Revenue, Animal Husbandry, Police, Public Works, Health and Family Welfare the Indian Coast Guard, Indian Navy, Marine Police and Education departments and electricity boards. The private sector the railways and the National Highway Authority of India, wildlife conservation and development NGOs, farmers' cooperatives and agricultural research institutions are relevant when dealing with conflict and conflict mitigation. The following measures are envisaged:

- Safety audits may be conducted each year, if feasible, to ensure that all members of the community act responsibly in the case of HCC and to facilitate inter-agency cooperation.
- Data relating to HCC cases (with reference to the developments in the area that may have a bearing on conflict cases) may be maintained for use in discussions in the DLCC.

3.10 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HCC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

Developing the capacities of SFDs, other line departments and agencies, including the Indian Coast Guard, the Fisheries Department, local communities and all key stakeholders may be facilitated to ensure that a holistic approach can be adopted:

- The SFDs may ensure that all the response teams from the Forest Department and other line departments and agencies are involved in a systematic approach to capacity development, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*.⁵
- The arrangements may be made for deployment of taking personnel and quick action on noticing conflict cases are to be strengthened in each forest division, and a system of resource sharing (e.g., specialised experts from response teams, other staff members and experts, and equipment across forest divisions) is to be developed.

5 Supplementary framework to HWC-NAP on establishment and capacity development of HWC mitigation response teams: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

4. ADOPTING MEASURES TO PREVENT HUMAN–CROCODILE CONFLICTS

The type of conflict and the mitigation depend on where the conflict is occurring and what its impact is on humans and crocodiles. HCC locations can be broadly grouped into two categories, which require different mitigation methods, with some overlap:

Crocodile Conservation Zone (conflict occurs here when humans enter for economic and recreational activities and daily rituals)

- Minimising the use of aquatic and forest habitats
- Capacity development

Crocodile–Human Interface Zone (the interface between crocodile breeding areas and cattle grazing grounds, village ponds, aquaculture farms and organic waste disposal sites/fish-processing units, etc.)

- Early warning system
- Deployment of RRT/PRT
- Barriers and deterrents
- Capture and translocation
- Release and rehabilitation
- Capacity development

4.1 IDENTIFICATION OF HOTSPOTS OF HCC

Identifying conflict hotspots⁶ that could also provide a direction towards the drivers of conflict is critical to providing site-specific solutions to mitigate HCC. Conflict hotspots of HCC can be mapped through geo-spatial assessments, by using both primary data and secondary data, including time-series data. The hotspots can be identified and mapped as follows.

- **Incident hotspot:** Frequency of occurrence of incidences over a specific period in the past, such as 5 or 10 years, mapped in the target area. The data include the number of incidences of injury and death and the number of attacks/killings of domestic animals.

- **Vulnerability hotspot:** Cumulative index determined by overlaying past incidents, the vulnerability of the local community and the potential risk of the area.

- The hotspot data can be overlaid on a GIS platform to generate a map of the ranging pattern of the animal-in-conflict to delineate its residence and movements in the core zone, interface zone and forest fringe area (agriculture–forest matrix) a PA.
- The use of predictive modelling based on geo-spatial data for hotspot mapping and robust spatial analyses and modelling tools, including scenario building, may be explored.

4.2 EFFECTIVE USE OF EARLY WARNING AND RAPID RESPONSE SYSTEMS AT HCC HOTSPOTS

A key requirement for addressing HCC effectively is deployment of an EWRR⁷ system at strategic locations in identified hotspots. This may enhance the overall efficiency of mitigation efforts in the field. The EWRR system should be in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*.⁸

- The EWRR system may be used to detect early conflict cases with crocodiles and to ensure appropriate responses in cases of HCC.
- The response teams may be placed on high alert at conflict hotspots during the rainy season (June to November), when aquatic bodies overflow, at high tide and during the breeding season.
- Further tools for establishing and implementing the EWRR system may be elaborated.

6 'HWC hotspots' are areas with actual or predicted repeated occurrences of HWC incidents that result in crop-loss, livestock death, human death and injury, and wildlife death and injury over temporal and spatial scales. The HWC can be static (repeated in the same place or time) or dynamic (shift in space and time over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

7 EWRR is a set of tools, processes and personnel competencies needed for the timely and meaningful generation and dissemination of alert information to individuals, communities and establishments at risk for optimal preparedness and response at the appropriate time to reduce the likelihood of injury, death or crop damage. EWRR will structurally include an HWC Mitigation Hub/Control Room and a system of three-tiered response teams, viz., division-level Rapid Response teams (Division RRTs), range-level Rapid Response Teams (Range RRTs) and village-/ward-level Primary Response Teams of the local community (Community PRTs).

8 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

4.3 MONITOR AND DOCUMENT 'POTENTIAL CROCODILES-IN-CONFLICT' IN THE LANDSCAPE

A potential crocodile-in-conflict is an individual that is likely to enter a HCC situation owing to its movement pattern or other behaviour.

Monitoring potential crocodiles-in-conflict at the land–water interface area may be carried out, as a preparedness and prevention measure, to ensure that their movements in the human-dominated landscape and seascape do not lead to an emergency situation.

The following are some examples of monitoring methods:

- Studying the population dynamics and spatio-temporal distribution using spotlight surveys and mark–recapture assessment, which can provide information for planning conflict mitigation measures
- Studies on the behavioural ecology of crocodiles to get good baseline data on animals-in-conflict and their attraction towards organic waste from aquaculture farms/fish-processing units.
- Monitoring individuals using satellite transmitters to get information on the movements of marked individuals
- Building (by SFDs) identification profiles of conflict/non-conflict crocodiles for identifying and differentiating individuals who get involved in conflicts and understanding their ranging patterns.

4.4 SUPPORT LOCAL POPULATION IN PREVENTING ACCIDENTAL ENCOUNTERS WITH CROCODILES

People living in HCC areas may be engaged to avoid accidental encounters, in the following ways:

- SFDs may facilitate, encourage and seek support from local NGOs, volunteers and other stakeholders to implement safety measures aimed at preventing human–crocodile encounters. These measures may include guiding humans to avoid the following activities, which exacerbate HCC:
 - Humans or livestock entering the aquatic habitats of crocodiles (wading or, swimming in an unprotected manner for daily rituals or economic or recreational purposes). Aquaculture farms near crocodile habitats attract crocodiles to the food and result in accidental encounters.
 - Using water bodies for rituals such as bathing and washing clothes and other items

- Entering water bodies for fishing, collection of crabs, snails and other molluscs and prawn seed, unauthorised fishing using makeshift canoes, etc.
 - Grazing of livestock along the water's edge.
 - Sudden encounters with nest-guarding crocodiles during the breeding season (nest-guarding muggers remaining close to their nests in the water and nest-guarding female saltwater crocodile in the wallows close to mound nests in the mangrove habitat).
 - Venturing into village ponds during floods and the dry season.
- Briefing of vulnerable groups, including fish workers and divers, may be done about the crocodile risk and safety issues.
 - Regular training programmes may be organised at local schools and colleges, and possibly during village meetings, at HCC hotspots to train humans in safety measures.
 - Safety audits may be conducted each year, if feasible, to ensure that all members of the community act responsibly in case there is HCC and to facilitate inter-agency cooperation.

4.5 SUPPORT THE LOCAL COMMUNITY IN USING BARRIERS AND OTHER EXCLUSIONARY MEASURES, ADOPTING A HARMONIOUS-COEXISTENCE APPROACH

Crocodiles in wetland habitats are elusive and can move fast into human-use areas. They enter low-lying forests and agricultural lands adjoining their habitats during the high tide, when nallas and creeks are flooded, and gain access to houses, tourist beaches and creeks. People using submerged areas for commuting, grazing cattle, fishing, washing, bathing and cleaning utensils are vulnerable to attacks. The use of the following barriers is envisaged for preventing chance encounters:

- Setting up an exclusion barrier (frill gate, net, bamboo fence, vegetative barrier, exclusion enclosure of wood and iron) is one of the most effective safety measures. Segregation of the crocodile habitat from the human habitation may be done by setting up moveable grill gates, crocodile-proof nets and bamboo fences
- Installing crocodile exclusion enclosures (CEE) to protect human habitation at conflict hotspots
- Segregation of footpaths from creeks/rivers/streams by erecting log bridges/culverts to facilitate crossing

- Setting up vegetative and semi-vegetative check dams in the upstream sections of freshwater streams as barriers to prevent crocodiles from gaining access
- Engagement of community-based institutions by SFDs along with wildlife experts/organisations to motivate, train and hand-hold the community in the use of exclusionary measures
- Awareness building and training related to the proper usage and maintenance of these barriers
- Supporting farmers through incentive mechanisms and subsidised funding for creating awareness and for using and maintaining barriers under district schemes (such as MGNREGS)
- Developing a compendium on good practices in setting up exclusion barriers for the use of the community

4.6 ADDRESSING HIGH-CONFLICT CROCODILE INDIVIDUALS

Male adult crocodiles occupying large territories and home ranges are more aggressive and have, therefore, higher potential to enter into a conflict situation when moving out into the lowlands during the high tide and rains. Some crocodiles are attracted towards organic waste dumped along the shore. The female crocodiles display antagonism when defending nests. The following measures are envisaged:

- SFDs may identify the high-conflict individuals from the conflict database.
- SFDs may test aversion conditioning to train habituated males who have the ability to breach barriers to reach organic waste dumps (waste from fish-processing units) close to their habitats. Satellite transmitters can be used to monitor the movements of high-conflict individuals.
- Capture and translocation (if required) or rehabilitation be carried out as per the guidelines and OPs, with the related monitoring protocols.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HCC

This is an indicative list of potential emergency⁹ situations, in order of decreasing priority:

- I. A crocodile has killed/injured a person.
- II. A crocodile has attacked livestock.
- III. A crocodile has entered human-use areas (village ponds/paddy fields/canals/other settlement areas)
- IV. An injured crocodile is to be rescued.
- V. A crocodile has died due to retaliatory action.

Key response procedures should be established, and actions promptly implemented/undertaken, to address emergency situations. Detailed step-by-step guidance is to be developed in the form of 'Operating Procedures for Addressing Emergency Response Situations'.

The key emergency response procedures are to be elaborated in the *Implementer's Toolkit*, and these should include the procedures listed in the following sections.

5.1 ESTABLISHING AN EMERGENCY RESPONSE MECHANISM

A strong institutional mechanism is required to respond to an emergency situation arising due to HCC. The response starts with detection of the incident, communication to the control room and dissemination of information to the officials and staff in the command-and-control hierarchy, including the forest and civil administration, for initiation of appropriate response actions. The Divisional Forest Office coordinates the action by deploying the RRTs to the incident site. The field support operations may be structured around the following key operational stages for synchronisation of activities to meet the emergency:

- Monitoring and creating situational awareness
- Mitigation hubs/control room/helplines to receiving and disseminating information
- RRT/PRT personnel, a veterinary team, equipment, and mobility and communication facilities are needed to address the emergency situation effectively and efficiently.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Operating procedures may be laid down in each forest division/district in line with these guidelines and in line with the institutional framework suggested under the HWC-NAP to ensure timely coordination amongst the various response teams from the Forest Department and other agencies, under the DLCC, consisting of the District Magistrate/District Collector, the police, the fire services, the Animal Husbandry Department, the Health Department, SDRF, NDRF, fisheries department, the Indian Coast Guard, Marine Police, paramilitary forces, etc. and the local community, especially local panchayat leaders and village community PRTs.

5.3 PREPAREDNESS OF RESPONSE TEAMS

- Operating procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (community PRTs, RRTs) are established and their capacities developed through training sessions and other measures, including training in relation to occupational health and safety.
- Operating procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of the need to prevent, manage and control zoonotic diseases and pandemics effectively.

⁹ An emergency or crisis situation can be defined as a situation that is sudden, unexpected and has the potential to be serious/ is serious in nature and therefore requires immediate intervention in time and space from concerned stakeholders to minimise the loss of lives and assets. The response to such emergencies involves prompt handling of situations and ensuring that the vulnerabilities of humans and crocodiles are reduced.

5.4 ACTION AT THE ONSET OF EMERGENCIES OR SPECIFIC SITUATIONS

5.4.1 Identification of Crocodiles-in-Conflict

- The CWLW can permit the hunting of a crocodile if she or he is satisfied that such an animal has become dangerous to human life or is disabled or diseased beyond recovery. However, she or he may record the reasons in writing after being satisfied after studying a report from field officers that the animal has been identified and could not be captured, tranquilised or translocated, but its presence is dangerous to human life
- Crocodiles are shy and camouflaged and hide in aquatic and muddy habitats. This elusive nature prevents immediate identification. The following steps may be taken to identify a crocodile that is involved in conflict:
 - Follow the track marks and other distinct signs to confirm and track the movements of the crocodile, and demarcate and map them.
 - Investigate an area within a 50 m radius of the incident site, focusing on trails, kills, carcasses, organic waste dumps, etc.
 - Deploy a number of cameras at strategic locations, depending on the predicted movements.
 - Investigate the existing camera trap database, if available, and identify the individual on the basis of distinct morphological features.

- Training sessions on identification of crocodiles-in-conflict may be organised for dedicated personnel of the Forest Department or, preferably, joint inter-agency and multi-stakeholder teams, using the training approach indicated in the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*¹⁰.

5.4.2 Other Key Response Actions during and after an Emergency

- Operating procedures may be laid down for step-wise key actions, for all emergency situations, media engagement and crowd management, that address health emergencies and post-response operations for the management of the animal. This includes ensuring the animal's health and safety during the capture, transport and selection of a translocation site and monitoring the animal after releasing it safely back into the wild.

10 Supplementary framework to HWC-NAP on establishment and capacity development of HWC mitigation response teams: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

6. REDUCING THE IMPACT OF HUMAN OR LIVESTOCK ON THE HEALTH AND OVERALL WELL-BEING OF AFFECTED PEOPLE

People living near crocodile habitats have sufficient knowledge about the habits and behaviour of the animal and the potential threats (as it is camouflaged and may attack ferociously). In spite of precautions, there is a probability of a chance encounter leading to human injury/death and retaliatory killings.

A major response to HCC has been to provide *ex gratia* for losses, but little evidence exists to support the claims that this has an impact on people's attitudes or on conservation of wildlife. Moral hazards and optimisation and leveraging of compensation schemes are a challenge.

6.1 ADDRESSING LOSS OF HUMAN LIFE AND INJURY

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family should be made into their bank accounts through Direct Benefit Transfer.
- In HCC hotspots, a revolving fund may also be established, at the division-level, to ensure that funds are available for providing immediate relief to a victim/family.

- In the case of an injury as a result of an encounter with a crocodile, the victim needs to be hospitalised immediately and *ex gratia* payments made as per the norms of the state government.

- Professional counselling through qualified psychiatrists/health workers may be useful in checking the effects of such traumatic incidents. The SFDs and other government agencies/institutions may organise some counselling sessions for victims and support them as they recover from the psychological impact.

6.2 ADDRESSING LOSS OF LIVESTOCK

- Loss of livestock or aquaculture may be compensated in accordance with government norms, at the earliest.
- An app-based system can be developed to expedite the process of making an *ex gratia* payment to the owner of a dead animal.
- SFDs may coordinate with the respective resident welfare associations for the *ex gratia* payment in the event of loss of livestock.

7. REDUCING THE IMPACT OF HCC ON THE HEALTH AND WELL-BEING OF AFFECTED CROCODILES

7.1 OVERALL MEASURES

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Articles 48A and 51A(g)) and in the statutory provisions of the Indian Penal Code (Sections 428 and 429), Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)) and Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.

7.2 CAPTURE AND HANDLING OF CROCODILES

Capturing crocodiles requires special skill and training, to ensure that the animal does not get stressed during the capture process, viz. the capture operation, post-capture retention, during handling of the animal, and during transportation.

- Young and sub-adult crocodiles may be captured using scoop nets and gill nets, while the adult may be snared using a night spotlight, or by setting up traps along the water's edge. Non-lethal harpooning may serve as a quick and efficient method of capturing crocodiles-in-conflict with minimum stress to the animal.
- The time of struggling during capture must be reduced to a minimum to reduce stress, and the crocodile must be restrained as soon as possible after the initial capture effort. If possible, chemical immobilisation may be used.
- The most effective method for holding an animal for any length of time is to leave it unrestrained within a specially designed crocodile transport box or floating trap.
- Any significant deviation from normal physiological parameters should be dealt with appropriately.

Health examination after capture and critical monitoring of the crocodile

- Great care should be taken by veterinarians to ensure that crocodiles are not exposed to direct sunlight for any length of time as these animal are prone to overheating. A crocodile's skin may be kept wet using sacks that are watered regularly to prevent sunburn, which causes cracking and bleeding between the scales.

- Care should be taken to ensure that crocodiles are not attacked by ants and that moist parts of the body, such as the eyes and nostrils, or open wounds, do not get flyblown.
- The condition of restrained animals may be monitored regularly. The physiological parameters (temperature, respiration, pulse and colour of the mucous membrane) need to be monitored continuously as these are likely to be compromised during capture.
- The eyes may be covered with a wet sack (hessian bag) to reduce visual stimulation, and the limbs should be kept free; otherwise oedema (fluid accumulation) in the feet occurs, leading to severe tissue damage or loss of limbs.
- The cloaca of a crocodile, where the reproductive and excretory organs are found, is a delicate and weakly muscled sac. If large crocodiles are lifted or transported without supporting the cloaca, it is possible to cause the collapse of the muscles of the cloaca and severe injury or death.

Transportation after capture

- The method of transport used for live crocodiles will generally be determined by the size of the crocodile or crocodiles involved. The animals may be transported in specially designed ventilated boxes of a smooth material that will limit frictional damage to the skin and claws.
- A simple restraining board with webbing straps may be effective for crocodiles up to 3 m long for short-term transport.
- Transport overland across earthen, unmetalled roads may be avoided to the extent possible as pounding on hard surfaces during transportation by boats or trucks can be fatal. Suitable cushioning may be used to minimise vibrations and shocks where these are unavoidable.
- Visual stimulation may be reduced by covering the eyes or keeping the crocodile in a dark container. Captured animals are in a stressed condition, and so the noise and handling may be kept to a minimum.
- Stops *en route* may be pre-planned and identified well in advance with the aim of achieving the shortest journey-time possible and ensuring the safety and

well-being of the animal.

- The animal needs to be monitored regularly for signs of discomfort or stress throughout the entire journey by veterinary professionals.

Food and water during transportation

- It is better to avoid providing feed and water during overnight transport, and efforts should be made to reach the destination (release site/rescue facility) as early as possible, taking due care of the vehicle speed and halts.

7.3 RELEASE ESSENTIALS

- The animals should be monitored for any transport injuries or any other health-related issues prior to their release.
- In case a crocodile is destined for captivity, the animal may be held in a fenced enclosure/kraal. This will provide the animal the chance to recover from anaesthetics as it gets acclimatised to its surroundings at a new location and will provide opportunities for intensive monitoring and veterinary management.
- The release site should have a proper unloading facility, and the release should be done with the least possible stress on the crocodile.
- As the effects of capture-stress may persist for many days, the animal may be closely monitored for the first few days after it is released.
- There may be a need for long-term monitoring of the health of the released individual/population.

Housing and sanitation

- In case the crocodile needs to be kept in captivity, the space provided to the crocodile should be as per the guidelines issued by the Central Zoo Authority.
- Proper sanitation and hygiene should be maintained to avoid infection.
- Adequate balanced food and water should be made available along with minerals and vitamin supplements as per the health status of the crocodile.

Health screening

- General health screening should be done periodically, and in case some serious health condition is suspected, samples may be collected and sent to institutes such as the Indian Veterinary Research Institute (IVRI) for more advanced investigations.

7.4 REHABILITATION OF CAPTURED CROCODILES

- In the case of a crocodile brought into captivity temporarily for treatment, its release after the treatment should take into consideration its past record in conflicts.
- Crocodiles that have a long record of conflicts and are injured may not be released but kept in lifetime care facilities as per CZA guidelines.

7.5 RADIO COLLARING OR TAGGING (RFID-MICROCHIP) CAPTURED CROCODILES

- Bio-logging is an important tool used for monitoring wildlife, including crocodiles. The following technologies can be utilised effectively to monitor crocodiles during relocation or translocation:
 - RFID microchips (PIT tags) may be used for tagging of all captured crocodiles brought into captivity as per CZA norms.
 - Cattle tags may be used for future identification.
 - A less conspicuous numbering system but a very useful one if crocodiles need to be re-caught for examination (e.g., weighing/measuring) is based on branding or cutting tail scutes.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK RELATED TO HCC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback on their implementation.

- The feedback on the use of these guidelines should, therefore, be consolidated to form the basis for fine-tuning these mitigation measures and for understanding

the capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback should also be used to further revise/update of the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT-TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives from government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology.¹¹ The experts had different roles in the drafting and editing process (Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors). The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and independent

wildlife and policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEFCC in December 2022, consisting of officials from MoEFCC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts should be analysed to assess the specific elements and sections that need to undergo changes. The revision should take place every 5 years from 2023 onwards. However, a mid-term revision process in 2024 may be desirable. In the long term, the revision cycle of these

guidelines can be aligned with the revision cycle of HWC-NAP.

- The mechanism, templates and guidance used for collating information and feedback on the use of these guidelines are to be elaborated in the *Implementer's Toolkit*.

11 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Ministry of Environment, Forest and Climate Change
Government of India
2023



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Guidelines for Mitigating Human–Rhesus Macaque Conflict

Taking a Harmonious-Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Mitigating Human–Rhesus Macaque Conflict

Taking a Harmonious–Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	JFM	Joint Forest Management
CCTV	Closed-circuit television	LTEM	Long-term Ecological Monitoring
CWLW	Chief Wildlife Warden	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-governmental organisation
DFO	Divisional Forest Officer	NTCA	National Tiger Conservation Authority
DLCC	District-Level Coordination Committee	NTG	National Technical Group
EDC	Eco-development Committee	NWAP	National Wildlife Action Plan
EIA	Environmental impact assessment	OPs	Operating procedures
EWRR	Early Warning and Rapid Response	PA	Protected area
GIS	Geographical information system	PCCF	Principal Chief Conservator of Forest
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PPE	Personal protective equipment
Gol	Government of India	PRT	Primary Response Team
HRMC	Human-Rhesus Macaque conflict	PZP	Porcine Zona Pellucida
HOFF	Head of Forest Force (in a state)	RFID	Radio frequency identification
HWC	Human-wildlife conflict	RRT	Rapid Response Team
HWC-MAP	Human-Wildlife Conflict Management Action Plan	SDRF	State Disaster Response Force
HWC-NAP	National Human-Wildlife Conflict Mitigation Strategy and Action Plan	SFD	State forest department
HWC-SAP	State-Level HWC Mitigation Strategy and Action Plan	SHG	Self-help group
IFS	Indian Forest Service	SLCC	State-Level Coordination Committee
IUCN	International Union for Conservation of Nature	SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	6
1.4 Legal and Policy Framework for Implementing the Guidelines	6
1.5 Institutional Mechanism for Implementing These Guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of HRMC	8
3.1 Overall Measures	8
3.2 Zonation	8
3.3 Monitoring and Managing Habitat-Related Drivers and Pressures	8
3.4 Measures to Strengthen Cross-sector Cooperation for Effective HRMC Mitigation	9
3.5 Facilitating Capacity Development Measures to Develop the Required Competencies for Addressing HRMC in the Most Effective and Efficient Manner	9
3.6 Measures to Strengthen the System of Knowledge Management in HRMC Mitigation	9
3.7 Systematic Research and Monitoring Addressing HRMC	9
3.8 Effective Garbage Management around HRMC Hotspots	10
4. Deploying Measures to Prevent HRMC	11
4.1 Mapping HRMC Hotspots and Monitoring the Populations at Hotspots	11
4.2 Community Awareness and Communication Measures to Reduce the Risk of Accidental Encounters and Retaliation	12
4.3 Support Farmers in Crop Protection and Other Exclusionary Measures, Taking a Harmonious-Coexistence Approach	12
4.4 Identification of Rhesus Macaque Troops-in-Conflict	12
4.5 Monitor and Document Potential Rhesus Macaques-in-Conflict in the Landscape	13
4.6 Effective Use of Rapid Response System at Each Hotspot	13
4.7 Scientific Management of Rhesus Macaque Population at Interface Areas or Conflict Hotspots	14
4.8 Managing Rhesus Macaques-in-Conflict in Urban/Rural Areas	14
4.9 Managing New Colonising Troops of Rhesus Macaque	14
4.10 Long-Term Measures for Scientific Management of Rhesus Macaque Population	14
4.11 Addressing Zoonotic and Other Emerging Diseases, Taking a One Health Approach	15
5. Addressing the Emergency Situations Arising due to HRMC	16
5.1 Establishment of Emergency Response Mechanism	16
5.2 Intra- and Inter-agency Coordination and Cooperation	16
5.3 Preparedness of Response Teams	16
5.4 Action at the Onset of an Emergency or Specific Situation	16
5.5 Key Response Actions During and After an Emergency	16
6. Reducing the Impact of HRMC on Health and Overall Well-being of Humans Affected	17
6.1 Addressing the Situation of Loss of Human Life/Injury	17
6.2 Addressing the Situation of Crop Damage	17
6.3 Addressing the Situation of Lost Livelihood Opportunities	17
7. Reducing the Impact of HWC on the Health and Well-being of Rhesus Macaques	18
7.1 Overall Measures	18
7.2 Addressing the Health and Well-being of Rhesus Macaques during Capture and Post-capture Operations	18
7.3 Addressing the Health and Well-being of Rhesus Macaques during a Release	19
8. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework Related to HRMC Mitigation in India	20
9. Process of Development, Pilot Testing of These Guidelines and Consultation Process	20
10. Monitoring and Evaluation of Guidelines	20
Annexe 1	21
National Technical Group (NTG)	21
Working Group on Pilot Implementation of Guidelines and HWC-NAP	21
Author Group for drafting the guidelines	21

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on human–Rhesus Macaque conflict mitigation (HRMC) get the overall context from the Wild Life (Protection) Act, 1972 (WLPA), National Wildlife Action Plan (2017-31)¹, the Advisory to Deal with Human–Wildlife Conflicts (MoEF&CC 2021) and the National Human–Wildlife Conflict Mitigation Strategy and Action Plan of India (2021–26) (HWC-NAP)². HWC-NAP provides the overall conceptual and institutional framework for implementing these guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good practice documents issued by various state governments and build on them to bring about a more holistic approach to HRMC mitigation.
- In addition to HRMC mitigation, following guidelines provide guidance on other selected species: guidelines for mitigating human–Elephant, –Gaur, –Snake, –Crocodile, –Wild Pig, –Bear, –Blue Bull, –Leopard and –Blackbuck conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HRMC in India, leading to co-existence, and to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and Rhesus Macaques.
- The guidelines provide advice on mitigation measures to be used to address HRMC in the long term, as well as facilitate the development, assessment, customisation and evaluation of site-specific HRMC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HRMC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HRMC mitigation and are not limited to state forest departments (SFDs).
- The guidelines will be able to bring in more effectiveness and efficiency when fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence approach³ to ensure that both humans and macaques are protected from negative impacts of HRMC.
- The guidelines address the issue of HRMC, taking a holistic approach. The holistic approach of the guidelines entails addressing not only the emergency situations arising due to immediate conflict situations but also the drivers and pressures that lead to HRMC; providing guidance on establishing and managing prevention methods; and reducing the impact of conflict both on humans and Rhesus Macaques.
- The development of these guidelines and their intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HRMC mitigation measures with key sectors and stakeholders at the national, state and local levels.
- The guidelines reflect on the need for a landscape approach while formulating solutions for mitigating HRMC to ensure sustainable solutions as unless comprehensive and integrated HRMC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementers through provision of the *Implementer's Toolkit* to provide operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act, 1972.
- The following laws are considered directly relevant for conservation when dealing with HRMC:
 - Wild Life (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HRMC.
- The Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India⁴ is to be referred to for more details on the specific legal provisions for HWC mitigation.
- Other important laws that facilitate conservation when dealing with HRMC include the Environment Protection Act, 1986, the Indian Penal Code, 1860, the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986, the Disaster Management Act, 2005, etc.

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTING THESE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed for implementing these guidelines.

1 MoEFCC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human-wildlife interactions on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans where both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

4 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2. CONTEXT AND SITUATION

- The Rhesus Macaque (*Macaca mulatta*) is a species of primate that has coexisted with human populations since time immemorial. A number of adaptive traits in macaques have enabled them to provide crucial mandatory ecological services in tropical environments, such as seed dispersal, pollination, and serving as food for top predators, especially hawks, eagles and mammalian carnivores. Rhesus Macaques are worshipped because of their religious and mythological relevance.
- The distribution range of the species in north India includes all the states/Union Territories except certain parts of Gujarat, Rajasthan, Jammu and Kashmir and Sikkim. In central and southern India, the distribution extends to parts of south Gujarat, north and eastern Maharashtra, and central and coastal regions of Andhra Pradesh and Telangana. Estimates of the Rhesus Macaque population across the distribution range in India are not available.
- In rural areas, with an interspersed agricultural lands and fragmented forests, semi-commensal macaques forage on agricultural/horticultural crops. The generalist and omnivorous habits of the Rhesus Macaque, its adaptable nature and its capability to forage in both urban and rural areas are some of the traits of this macaque that have led to the survival of the species in higher densities within human-dominated landscapes compared with forests, subsequently leading to conflicts between humans and Rhesus Macaques.
- HRMC refers to the negative interaction between humans and Rhesus Macaques, leading to adverse impacts on humans or their resources, such as death and injury, crop damage and loss of property, apart from affecting emotional well-being, and on the Rhesus Macaques or their habitats.
- HRMC is driven by fragmentation and degradation of habitats, expansion of agricultural lands and localised increases in Rhesus Macaque populations. Increased food availability, through crop fields, in human-dominated areas, inadequate garbage management and behavioural factors of the Rhesus Macaque have exacerbated the pressure and resulted in increased HRMC over the past few decades in specific areas. Contrary to popular belief, the macaque presence in human-dominated landscapes is not entirely due to unavailability of food in the forest but due to the adaptive behaviour of the Rhesus Macaque and to the availability of easy and high-energy food and absence of natural macaque predators in such areas.
- HRMC affects human societies in terms of loss of livelihood opportunities, economic losses, negative emotional impacts and human deaths and injuries, while the macaques are affected in terms of the growing intolerance of humans towards Rhesus Macaque leading to retaliatory actions.
- Capture and translocation of macaques-in-conflict have often only resulted in the transfer of the problem to newer areas—the original conflict spot is occupied due to immigration or expansion of neighbouring troops into vacated areas. Rather than being a mitigative measure, translocation has become an HRMC intensifier in most instances. In some instances, the translocated troops have mixed with populations of the endemic peninsular Bonnet Macaque (*Macaca radiata*). Similarly, some large-scale translocations have even led to expansion of the range of the species in peninsular India, thereby increasing the geographic spread of HRMC.
- Further information and data needs to be generated (in terms of numbers and trends in HRMC cases, crop damage assessment criteria, etc.), to ensure the development of effective mitigation measures. Periodic estimation of the Rhesus Macaque population across the distribution range in India is the highest priority. In states where Rhesus Macaques were declared vermin, permitting their hunting as a measure to reduce HRMC, effectiveness of such measures may be studied and further strengthening of these measures may be done; capacity needs assessment of the local community as well as the frontline staff may be done in order to assess the capacity development needs for effective HRMC. Some states have used non-lethal mitigation measures with considerable success, the long-term effectiveness of these measures is yet to be assessed.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HRMC

3.1 OVERALL MEASURES

A major gap involves effective problem analysis to identify drivers and pressures of conflict and thereby select mitigation measures appropriately.

- A systematic analysis of HRMC mitigation methods may be done to assess their effectiveness and wildlife-friendliness in different types of conflict situations. This will facilitate customisation and adaption of mitigation measures or combining two or more mitigation measures to achieve the best possible impacts in the field.

3.2 ZONATION

Commensal and semi-commensal macaques come into contact with humans in three basic contexts: crop-foraging, provisioning at religious/tourist sites and cohabitation with humans in semi-urban/urban/rural areas. The distribution, demography and behavioural characteristics determine the zone of influence of macaques. The feasibility of mitigation of HRMC is variable with commensal and semi-commensal macaques, with some situations requiring mild to significant interventions.

Three management zones can be identified on the basis of intensity of conflict and management interventions. Zonation will allow a science-based and pragmatic approach to landscape-level planning for both HRMC mitigation and conservation.

- **Rhesus Macaque conservation zone:** This zone consists of forested areas, wherein resident macaques rarely come into conflict with humans as they are shy and avoid human interactions. Habitat restoration and amelioration activities to address habitat degradation may be undertaken in this zone. Habitat restoration should be based on the native species of the region. No special interventions may be needed for Rhesus Macaque management.
- **Forest-human interface and co-existence zone:** In this zone, macaque conservation and human livelihoods may be balanced and reconciled. This zone consists mainly of community- or privately-managed forest fringes/agricultural areas and supports most of the macaque populations. Agricultural fields, isolated village forests replete with natural food for macaques and waste or unused land also fall in this zone. The activities/behaviour of both humans and macaques can be managed in this zone.

- **Rhesus Macaque management zone:** This zone includes urban and rural landscapes where macaques do not have adequate natural habitats and thus entirely depend on human provisioning, on edible items in houses and on garbage dumps. High levels of macaque aggression towards humans are also quite common in such places, leading to bites and high level of stress, posing risks to both macaques and humans. Major HRMC measures in this zone will call for changes in human behaviour, effective management of garbage/food waste and scientific management of rhesus macaque population.

3.3 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

Habitat loss, fragmentation and degradation are key drivers leading emigration of forest-dwelling macaque troops to new areas, resulting in HRMC in the forest fringes, agricultural areas and urban areas. As forests support the source population of Rhesus Macaques, whenever a troop in the agricultural interface or urban areas are removed or displaced, new troops from forests may move in to fill the void. Thus, to prevent such unending cycles, it would be essential to prevent any further fragmentation and degradation of natural forest habitats.

Most of the macaque troops involved in HRMC outside the forests or PAs have, however, already adapted to live with humans as commensals, and such troops do not seem to be affected any more by forest loss and degradation.

- Monitoring forest fragmentation and degradation may be carried out by establishing permanent plots for long-term ecological monitoring (LTEM) by the respective SFDs. Long-term monitoring can also be initiated through research institutions and organisations monitoring the effects of climate change and anthropogenic pressures on forests.
- There is a possibility that unsustainable extraction of NTFPs, especially fruits and nuts (natural food items of Rhesus Macaques), leads to a decrease in overall resource availability and to a decrease in the ability of Rhesus Macaques to sustain themselves inside forested habitats. Overexploitation and unscientific harvesting of NTFPs decreases natural forest regeneration and productivity. Not only does this affect the foraging habitat of Rhesus Macaques and other

wildlife and leads to a gradual loss of livelihoods of forest-dwelling communities. The primary objective of any management intervention may be to bring about better livelihood opportunities and reduce the dependence of humans on forest biomass.

3.4 MEASURES TO STRENGTHEN CROSS-SECTOR COOPERATION FOR EFFECTIVE HRMC MITIGATION

Cross-sectoral cooperation for HRMC mitigation entails engaging multiple stakeholders from different sectors and domains at the national, state, landscape and district/forest division levels. The following measures are envisaged:

- State-level Coordination Committees (SLCC), landscape-level multi-stakeholder fora and District-level Coordination Committees (DLCC) may be used to strengthen the inter-agency coordination required for HRMC, and a district-specific operational mechanism may be developed to address specific needs of HRMC mitigation.
- Safety audits may be conducted each year, if feasible, to ensure that all members of the community act responsibly in the case of HRMC and to facilitate inter-agency cooperation.

3.5 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HRMC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

To ensure that HRMC mitigation measures are planned and implemented keeping in mind animal welfare and ethical considerations, as well as the safety and health of the response teams and other field personnel, the SFDs may ensure that all response team personnel from forest and other line departments and agencies are brought under a systematic approach to capacity development, in line with the Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams⁵.

- Regular and systematic specialised training programmes may be conducted on critical operations such as rescue, capture and translocation jointly with other key departments in the form of mock-drills and simulation training sessions.

- Advanced training programmes on animal welfare issues may be conducted for all personnel of the RRTs and Community PRTs.
- The competencies of members of RRTs may be reviewed on a regular basis and the curriculum for their training may be fine-tuned and updated regularly, in line with the Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams.

3.6 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT IN HRMC MITIGATION

To ensure that HRMC mitigation measures are effective and sustainable, it is essential that not only are field experiences, learnings, field-evidence and conceptual advances shared across key stakeholders and landscapes but that such knowledge is also documented for utilisation in future strategies and plans related to HRMC mitigation.

- The National HWC Mitigation Forum, landscape-level multi-stakeholder fora and appropriate working groups may be used to share field experiences and learnings within the forest department, across stakeholders, and across landscapes.
- Measures are to be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances related to HRMC mitigation, to inform future HRMC mitigation strategies and plans.

3.7 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HRMC

HRMC mitigation is an extremely challenging subject as Rhesus Macaques are very intelligent and learn to adapt to any mitigation method very quickly. In recent times, economic, cultural, ecological and several other parameters have all altered the demographic and population parameters, breeding behaviour and troop dynamics of macaques, including early sexual maturity and increased birth rates.

- Generating information on the status and distribution of the macaques locally and developing an understanding of their interactions with human societies are the basic steps towards HRMC mitigation.

⁵ Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams, available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

- Studies, surveys and research may be facilitated to generate quantitative information on the use of habitats, ranging patterns, breeding behaviour, etc. of Rhesus Macaques in relation to recent anthropogenic changes and availability of provisioned food, throughout the known distribution range of the species.
- Studies and surveys may be conducted to generate information on the dispersal, survival and mortality factors of adults, juveniles and dispersing individuals. These may include focal status surveys as well as dedicated telemetry and behavioural studies throughout the species' range.
- SFDs may facilitate research institutions, NGOs and experts involved in mitigation of HRMC to carry out result-oriented research on the following:
 - Implications of the release of Rhesus Macaques outside their current known range. As part of earlier mitigation measures, Rhesus Macaques were captured and released outside their historical distributional range at several locations. This has led to an increase in conflicts at such release areas as the Rhesus Macaque is a temperamentally more aggressive species, compared with the native Bonnet Macaques, at the new locations.
 - Impacts of mixed-species troops and hybridisation on potential future conflict. Mixed-species troops do occur, in which both macaque species (Rhesus Macaque and Bonnet Macaque) function as any typical macaque troop. Hybridisation in such mixed-species troops has not been ruled out by primatologists. Regular monitoring at the distribution boundaries of these species and their overlap zones is essential to check for possible hybrids and their behavioural traits.
 - Methods of scientific management of rhesus macaque population need to be standardised, especially the methods of capture, reproductive control, post-surgical rehabilitation and release of these macaques into existing troops in their distribution range.
 - Comparing the differences in ranging behaviour and habitat use of commensal macaques and semi-commensal macaques-in-conflict will help identify drivers and pressures that bring Rhesus Macaques into conflict. Studies on the behavioural ecology of Rhesus Macaques in urban/rural areas may be encouraged to get good baseline data on the species. A good understanding of its ranging and foraging

patterns and the extent of injury and harm these animals cause to humans, their holdings and property can help devise better strategies to handle conflicts.

- Global good practices in mitigating the human-macaque conflict may be compiled, assessed for their feasibility at specific locations, implemented on pilot basis and if found suitable, may be considered for implementation.

3.8 EFFECTIVE GARBAGE MANAGEMENT AROUND HRMC HOTSPOTS

In urban areas

Garbage bins are the most important anthropogenic aspects of human-macaque interface zones since they are easily accessible, high-yielding, reliable and regularly replenished food sources for macaques.

In urban areas, where natural food is not available, such garbage bins form an important part of the foraging habitat on which macaques are entirely dependent, and these are actively defended territories of Rhesus Macaque troops. These bins tend to be monopolised by a few individual macaques, and naturally, there will be heightened aggressive behaviour shown by the troop members to control and defend these resource patches. Humans also end up at the receiving end of such misdirected aggression. Individuals subdued by dominant macaques redirect their aggression to a lower-ranked individual or to humans present nearby.

Effective garbage management, to ensure that food is not available for macaque troops, is a crucial measure to control the population and behaviour of this species in human-dominated landscapes.

- At all HRMC hotspots, innovative and site-specific designs of garbage bins may be developed to ensure that Rhesus Macaques are not able to access the garbage in these bins.
- In addition to garbage bins, plan other interventions to gradually and strategically move out Rhesus Macaque troops to alternate natural food sources nearby, if any.
- SFDs may coordinate with local municipalities/ sanitation departments to ensure that such measures are implemented widely and in the long term.
- The possibility of installing macaque-proof garbage bins at HRMC hotspots, and implementing other such measures, under the Swachh Bharat Mission may be explored.

In rural areas

- SFDs may coordinate with District Collectors and Panchayati Raj Institutions, especially focusing on cooperation with panchayats of villages that are adjacent to forests, regarding effective garbage management.
- Community PRTs may periodically inspect the forest perimeter near villages/towns to ensure that poor disposal of garbage or food waste, if detected, is brought to the notice of the local authorities.
- Aversion conditioning measures may be implemented in areas where Rhesus Macaques have started foraging in villages and towns in search of food.
- The vegetable and food waste generated at weekly markets in rural India, garbage thrown along roads and railway lines passing through forests and other such food may attract Rhesus Macaques and may

lead to accidental encounters with humans. SFDs may coordinate with the local administration for organizing such markets overall in such a way that garbage is effectively managed and does not attract Rhesus Macaques.

- Awareness-building on macaque behaviour related to garbage availability among local communities may be intensified.
- Signage may be placed along roads, markets, religious places, etc. to reinforce the awareness building measures.
- Effective garbage disposal facilities at the above sites may be supported.
- Routine inspection of roads and other common areas may done by SFDs and associated stakeholders.

4. DEPLOYING MEASURES TO PREVENT HRMC

4.1 MAPPING HRMC HOTSPOTS AND MONITORING THE POPULATIONS AT HOTSPOTS

Identifying HWC hotspots⁶, which could also provide indicators about the drivers of conflict, is critical to provide site-specific solutions to mitigate HRMC. Conflict hotspots of HRMC can be mapped through geo-spatial assessments, by using both primary data and secondary data, including time-series data. The hotspots can be identified and mapped as follows:

- **Incident hotspots:** Frequency of occurrence of incidences over a specific period, such as 5 or 10 years, mapped over the target area. The data include numbers of incidents of injury and death (of humans or macaques) and, in very rare cases, attacks/killing of small domestic animals.
- **Vulnerability hotspots:** Cumulative index obtained by overlaying past incidents, vulnerability of local community and potential risk of the area.

Hotspots, or conflict-prone sites, may vary or shift, depending upon the season and crop rotation pattern. A baseline of population can be developed at the hotspots. Later on, all incidences of conflict over a year may be recorded in detail in the databases. This helps in enriching the database, using which the ecological aspects can be analysed to determine the resting places, movement routes into human areas and seasonal changes in these patterns.

- Mapping can be done on the basis of the existing data relating to crop damage, encounters with humans and injury or death of humans or macaque. The conflict type can be classified according to the different mitigation measures, while conflict zones can be separated as low- or high-conflict zones. Heat-maps (showing areas with a high probability of HRMC) can be created using GIS tools.
- A risk zonation map showing low- to high-conflict areas can be prepared using these data, and regular updating will help create a more dynamic (spatio-temporal) map of the conflict zones.

4.2 COMMUNITY AWARENESS AND COMMUNICATION MEASURES TO REDUCE THE RISK OF ACCIDENTAL ENCOUNTERS AND RETALIATION

Local communities are one of the most important stakeholders in HRMC mitigation. Other important stakeholders are the private sector, plantation owners and workers, farmers, tourism-sector organisations, industries, the transportation sector, local businesses, law enforcement agencies, local primary health centres and other government agencies. To facilitate effective engagement of local communities and various stakeholders in mitigation of HRMC, it is extremely important to plan and implement awareness and sensitisation measures, taking a participatory approach.

- Appropriate community awareness and communication measures may be implemented at HRMC hotspots, and their impacts may be assessed periodically to ensure that the awareness and communication measures are locally customised.
- Tools for developing, implementing and customizing community awareness and communication measures may be developed.

4.3 SUPPORT FARMERS IN CROP PROTECTION AND OTHER EXCLUSIONARY MEASURES, TAKING A HARMONIOUS COEXISTENCE APPROACH

Most of the communities at the rural village–forest interface experiencing HRMC have developed indigenous methods of deterring Rhesus Macaques. The successful ones among these may be identified, studied and customised to enhance their effectiveness and wildlife-friendliness.

Site-specific deterrents for Rhesus Macaque may be explored from the following five categories:

- **Acoustic (hearing):** High-pitched ultrasonic monkey repellers have been used as effective means of repelling macaques in certain countries and in a few places in India.
- **Visual (vision):** Visual stimuli, such as cloth curtains and models of predators (Leopard/Tiger) have

⁶ “HWC hotspots” are areas with actual or predicted repeated occurrences of HWC incidents resulting in crop-loss, human death and injury, and wildlife death and injury over temporal and spatial scales. Such hotspots can be static (in the same place or time) or dynamic (shifting in space and time over years). In addition to count the statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

been designed, primarily to repel macaques from agricultural fields and orchards. Spotlights, flashing lights and strobe lights have often been used to repel Rhesus Macaques.

- Taste: Food items despised by macaques can be used for conditional taste aversion. These food items should not harm the macaques.
- Olfactory (smell): Substances that give off strong odours can also be used as repellents. Such agents can also be mixed with aversive agents to elicit a conditioned aversion.
- Tactile (touch): Power fences with oscillating currents deter macaques and may be erected as barriers.
- Behavioral conditioning: Continuous guarding of crops by farmers and using non-lethal methods to drive macaques away, each time they enter the field, is likely to condition the behaviour of macaques and reduce the occurrences of them entering the crop fields in future.
- Beating of drums or tin cans and shouting are the most common repellent measures, with varying degrees of effectiveness in different situations.
- Community-based institutions may be engaged by the SFDs together with wildlife experts/organisations in motivating, training and hand-holding the community, in the development of innovative and locally-customised exclusionary measures that are effective and wildlife-friendly.

It may be considered that physical deterrents may not succeed for long due to the ability of macaques to learn, adapt and avoid them. Therefore, these measures need to be constantly customised and adapted to ensure their effectiveness even while ensuring that these remain wildlife-friendly.

4.4 IDENTIFICATION OF RHESUS MACAQUE TROOPS-IN-CONFLICT

- Rhesus Macaques-in-conflict, individuals or groups, can be characterised as semi-commensals, casual (opportunistic) groups or commensals that are repeat (obligatory) crop-foraging individuals.

The following steps may be taken to identify the Rhesus Macaques that are most likely to come into conflict with humans.

- The ranging and foraging behaviour of the Rhesus Macaques in their territories (feeding from croplands/ kitchen gardens and on food waste) may be identified, mapped and tracked.

- Observe and pick out unique morphological identification features, assess the troop hierarchy and follow the troops as they traverse human-dominated areas.
- Investigate all conflict-related incidents that take place when they move along the fringes of forest and in human-use areas.
- Deploy a number of CCTV cameras at strategic locations to cover the predicted movement routes of particular troops.
- Analyse the data relating to their ranging and foraging behaviour and the intensity and nature of the conflicts.

4.5 MONITOR AND DOCUMENT POTENTIAL RHESUS MACAQUES-IN-CONFLICT IN THE LANDSCAPE

- Before initiating conflict mitigation, it is essential to know the demography and population status of the target macaque population. Population changes, measured via annual population estimation, could be the major deciding factor in the scientific management of rhesus macaque population. Regular population estimation every 5 years across the habitat can help monitor the macaque population at the state level. For monitoring populations at individual hotspots, annual monitoring may be conducted within a designated month (i.e., same month each year) to avoid the effect of breeding season variability on the estimate.
- Monitoring populations of Rhesus Macaques may have a focus on the human-use landscapes as the species is more common in such areas. Agricultural and revenue departments, being key stakeholders in HRMC mitigation, could be involved in such population estimation.
- Monitoring of individual macaques or troops can be conducted by tracking known individuals/troops, on the basis of distinct morphological features, and associations and hierarchies in troops.
- It may be useful to create individual identification profiles of alpha males, adult females and breeding adults and juveniles in the troop, producing a database of identified macaque individuals or troops that are in high conflict, with their respective territorial areas of operation. Local universities and other organisations may be engaged for such monitoring to ensure efficiency and sustainability.
 - Initially the focus can be on building identification profiles of macaque troops that get involved in conflicts.

- Data may be gathered on not-in-conflict troops occurring inside forests that are not exposed to food provisioning and associations with humans.
- A conflict, ranging and habitat use profile can be developed for all identified Rhesus Macaques/ troops.
- The following studies/assessments may be conducted in forest–urban–rural interface areas for devising mitigation strategies:
 - Population estimation, monitoring and carrying capacity assessments
 - Resource use patterns of macaques
 - Factors explaining macaque presence in forest–human interface areas and factors that correlate and facilitate macaque persistence in the urban/ rural landscape
 - Estimation of ranging patterns and predicting the conflict probabilities within and between habitats.

4.6 EFFECTIVE USE OF RAPID RESPONSE SYSTEM AT EACH HOTSPOT

Guarding crops during the daytime from vantage points is one of the most effective early warning and deterrent techniques.

Most often, HRMC does not necessitate immediate action by specialised response teams, as required for incidents with other species-in-conflict. However, in a few instances, where there are sporadic incidents of aggression and recurrences, the situation may demand immediate action. RRTs/Community PRTs may respond quickly to address the situation, including driving the macaques away from the incident site. Therefore, the RRTs and PRTs may also be trained in HRMC mitigation measures in such situations.

- The responses of the RRTs, in such cases of HRMC, may be focussed on driving the macaques away or capturing and translocating them, after proper planning, with adequate personnel, veterinary support, vehicles and equipment. The Community PRTs can support the RRTs in certain aspects of this operation, such as crowd management and dissemination of information to the public.
- Apart from addressing emergency situations, such rapid responses may also facilitate aversion conditioning in macaque troops. With constant denial of access to food waste or other anthropogenic food items, and constant interventions from RRTs and/or the people, the macaques' behaviour will change to the point where they no longer enter such households/shops or crop fields.

4.7 SCIENTIFIC MANAGEMENT OF RHESUS MACAQUE POPULATION AT INTERFACE AREAS OR CONFLICT HOTSPOTS

A local overabundance of wildlife, including Rhesus Macaques, could be due to a reduction in carrying capacity of the natural habitat of the source population, brought about by habitat loss and degradation and fragmentation of natural habitats. It could also be due to an exponential growth in the population of macaques, or it could be a combination of the two. It is therefore important to determine which factor is driving the overabundance so that the appropriate interventions can be selected.

- Managing local overabundance requires good knowledge and data on population size, dynamics, ranging of various clans, habitat variables, HRMC, etc. SFDs may work towards building both internal capacity and collaborations with research institutes and researchers to achieve the high standards of data collection and analysis needed for scientific management of Rhesus Macaque population.
- SFDs may adopt a robust population monitoring protocol and implement it using trained field staff, or in collaboration with research institutes or local universities/colleges.

4.8 MANAGING RHESUS MACAQUES-IN-CONFLICT IN URBAN/RURAL AREAS

In areas with severe HRMC, especially the rural–forest interface, the following three options may be explored for scientific management of rhesus macaque populations:

- Capture and translocation of macaque troops-in-conflict to suitable habitats: When Rhesus Macaque troops are non-commensal, they leave their forest habitats and migrate into the rural/urban landscape. Such troops may be identified before they get habituated to human provisioning. Such macaque are normally small and do not cause severe incidents resulting in damage to crops and property and injury to humans. They may be promptly captured and released in their habitat and monitored.
- Large troops of commensal/semi-commensal macaques in the rural/urban landscape that are habituated to provisioning of food may be captured according to the protocol and taken to mass sterilisation centres. Reproductive control measures may be initiated and the macaques subsequently released in the same habitats.

- Capturing and retaining macaque individuals/troop in a rescue centre for lifetime care: Injured and disabled animals are not to be released. They may be kept in a lifetime care facility. There are several states that have created such lifetime care monkey rescue facilities, with the permission of CZA.

4.9 MANAGING NEW COLONIZING TROOPS OF RHESUS MACAQUE

Rhesus Macaques living inside forests are non-commensal populations that forage and breed within forests. They form self-sustaining stable populations. These forest residents may, for some reason, venture into the adjoining agricultural landscape in search of new areas to colonise. Once there, they start feeding on edible agricultural produce and adapt to this new environment.

- Such populations are to be quickly identified, monitored and captured for translocation back into the forest areas before they get habituated.
- Long-term studies may be conducted to understand the changes in the ecological and behavioural parameters of these macaques. These dispersing populations may be captured and returned back to their natal ranges after population–habitat viability analyses.

4.10 LONG-TERM MEASURES FOR SCIENTIFIC MANAGEMENT OF RHESUS MACAQUE POPULATION

Various short-term deterrence methods provide immediate mitigation at local sites of conflict and are often useful. However, such deterrents may not succeed for very long because of the macaques' ability to learn, adapt to and avoid/circumvent these deterrents. Moreover, there may be opposition on ethical grounds to the use of lethal methods to control macaque populations. In many high-conflict areas, short-term deterrence has worked during the initial phases but has quickly lost its effectiveness.

The following scientific population management methods may be useful at HRMC hotspots.

- Surgical sterilisation of male macaques by thermo-cauteric coagulative vasectomy and of female macaques by endoscopic thermo-cauteric tubectomy are generally practiced. The main advantage over the newer developments is that the sterility caused is permanent. After the specified recovery time, the macaques may be released within the same area where they were trapped.

- Non-surgical contraception. Another method that is being tried for long-term population control is immuno-contraception using certain chemicals, hormones and vaccines e.g. the porcine zona pellucida (PZP) contraceptive vaccine. The efficacy of this method with free ranging macaques should be determined.

4.11 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH

The response teams and other stakeholders at HWC hotspots are vulnerable to a variety of zoonotic diseases that can be transmitted from different animals. There is also a risk of disease transmission between domestic animals and wildlife and a risk of disease transmission between humans and domestic animals:

- Veterinary capacities and infrastructure may be upgraded, to facilitate disease monitoring in rhesus macaques for both Rhesus Macaque conservation and to prevent zoonotic diseases from spreading to livestock and human populations.
- A well formulated Wildlife Health Management and Disease Surveillance Plan may be in place at every division/protected area.
- All the personnel involved in capture operations may be trained, vaccinated and equipped.
- The basic approach may be to integrate the concept of 'One Health'⁷, which links human and animal health in a shared environment, into all the operations and HRMC mitigation measures in the field.

⁷ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HRMC

HRMC is continuous in space and time as macaque populations inhabit urban and rural areas, taking refuge in both small forest patches and buildings, holding distinct territories and having movement routes. Driving the macaques away may not always be effective as even if they move from one area to another they return to the location from where they were driven.

There could be HRMC situations that result in human injury and loss of life (rare cases) or property. If provoked by human action, there are aggressive mass retaliations by entire troops. These have the potential to escalate into serious conflict situations, leading to human injury and (rarely) death and require immediate intervention.

An indicative list of the potential emergency situations⁸ is provided here in decreasing order of priority:

- A Rhesus Macaque has injured a person.
- A Rhesus Macaque has entered a building and is posing a risk or threat to humans.
- Rhesus Macaque troops have entered a farmer's fields and are damaging horticultural and other crops.
- A Rhesus Macaque is injured

Key response procedures are to be established and actions promptly implemented/undertaken for addressing emergency situations. Detailed step-by-step guidance may be developed as "Operating Procedures for Addressing Emergency Response Situations".

- The key emergency response procedures are presented in the following sections.

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

- HRMC may not require an emergency response, unlike conflicts involving other animals. However, sometimes the situation develops into an emergency when the (probably provoked) Rhesus Macaques become violent and aggressive, injuring humans, usually in a retaliatory fashion or the Rhesus Macaque is injured. In such rare cases, a quick response from community-level PRTs/RRT is necessary.
- A mechanism is required at each division for communicating with key officials and for communicating information for initiation of appropriate response actions at the site of the incident.
- Establishment of 24*7 Toll Free number for soliciting help of Rescue Teams; and establishment of / use of existing Rapid Response Teams, well equipped with vehicles, human resources and equipment, and trained using competencies-based training measures. Hubs may be in place for receiving the information and transmitting it onwards for quick responses. The hubs may be set up in easily accessible locations.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Procedures may be laid down in each division, in line with these guidelines, to ensure timely coordination amongst the response teams as well as with key stakeholders such as local NGOs and the animal husbandry, agriculture and health departments, under the DLCC.

5.3 PREPAREDNESS OF RESPONSE TEAMS

- Operating procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (Community PRTs, RRTs) are established and their capacity development is facilitated through training programmes and other measures, including training sessions on occupational health and safety.
- Operating procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of effective zoonotic disease and pandemic prevention, management and control.

5.4 ACTION AT THE ONSET OF EMERGENCY OR SPECIFIC SITUATIONS

- Operating procedures are to be laid down to receive, channelise and disseminate information at the onset of any emergency, from the site of the incident to related forest officials and the HWC Mitigation Hub and to disseminate the information to requisition related response actions at the emergency site.

5.5 KEY RESPONSE ACTIONS DURING AND AFTER AN EMERGENCY

- Operating procedures may be laid down for step-wise key actions (media engagement, crowd management, addressing health emergencies, and post-response operation for management of animals) for all emergencies. This includes ensuring the animal's health and safety during capture and transport to a translocation site and monitoring the animal after it is released safely back into the wild.

⁸ Emergency or crisis situations can be defined as situations that are sudden, unexpected, have the potential to be serious/are serious in nature and therefore require immediate intervention in time and space, from concerned stakeholders, to minimise the loss of lives and assets.

6. REDUCING THE IMPACT OF HRMC ON HEALTH AND OVERALL WELL-BEING OF HUMANS

Most urban and rural communities have co-existed with Rhesus Macaques for years. But the recent situations where new hotspots of HRMC are formed due to either translocation of Rhesus Macaques to new areas or range expansion by the macaques require innovative mitigation measures.

Humans living in Rhesus Macaque territories in urban and rural areas are familiar with their habits and behaviour. They largely avoid the macaques, but any stimulus may excite the animals, leading to injuries to either or both parties. The fear psychosis among the public leads to decreased tolerance levels and retaliatory actions against the macaques. This further exacerbates the specific interaction, which may be controlled.

6.1 ADDRESSING THE SITUATION OF LOSS OF HUMAN LIFE/INJURY

- Loss of human life due to negative interactions with Rhesus Macaque is very rare. Nevertheless, there can be provisions of *ex gratia* to the family of a victim.
- The Rhesus Macaques in urban and rural areas beyond SFD jurisdictions may also interact aggressively, leading to injury and, rarely, death of humans. In such cases, the district administration or municipal councils may provide *ex gratia* payments as relief for the losses.

6.2 ADDRESSING THE SITUATION OF CROP DAMAGE

Assessing the long-term impacts of crop damage is complex. Payment of inadequate *ex gratia* to farmers will lead to resentment among the people, leading to adverse impacts on wildlife conservation due to retaliatory action. Payment of *ex gratia* is equally challenging as it might also lead to laxity in crop protection and inhibit the process of finding innovative ways of crop guarding.

- Collaborative efforts can be made to promote market-based arrangements for alternate crops, wherever feasible. Community PRTs may be engaged to facilitate this process in their respective villages/areas of operation.
- The process of settling *ex gratia* payment for crop or property loss should be transparent and simplified. Mobile apps may be used for collecting the information and processing the claims of farmers related to crop damage caused by Rhesus Macaques

to ensure that there is efficiency and transparency in the system.

- Farmers may be encouraged and facilitated through community-based institutions to explore solutions such as changes in cropping patterns and the use of crops that are non-palatable to Rhesus Macaques.
- Site-specific studies may be conducted in collaboration with agricultural research institutes to find appropriate crops that are non-palatable to Rhesus Macaques.
- The Ministry of Agriculture and Farmers Welfare has included crop depredation by wild animals under its flagship scheme, *Pradhan Mantri Fasal Bima Yojana* (PMFBY). This scheme can be used as an important HRMC mitigation instrument.
- Dialogue may be initiated with the insurance sector for providing insurance cover for damage due to HRMC. Insurance can be considered for damage to standing crops besides injuries/loss of life sustained by human beings. The modalities may vary for such insurance from place to place according to the assessment of risk by the insurance companies. The feasibility at the state level may also be explored.

6.3 ADDRESSING THE SITUATION OF LOST LIVELIHOOD OPPORTUNITIES

Abandonment of farming practices in high-HRMC areas is a critical issue that can be addressed through cross-sector cooperation. The following may be implemented:

- Systematic assessments of the extent and scale of lost livelihood opportunities and other indirect impacts due to HRMC may be conducted.
- Development of skills for alternative non-land/non-farming-based income generation opportunities.
- Self-help groups (SHGs) facilitating small businesses in the adoption of non-land/non-farming-based alternatives.

7.

REDUCING THE IMPACT OF HRMC ON THE HEALTH AND WELL-BEING OF RHESUS MACAQUES

7.1 OVERALL MEASURES

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Article 48A and 51A(g)) and as per the statutory provisions of the Indian Penal Code (Sections 428 and 429), the Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), the Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.
- The use of mitigation measures that are harmful to macaques may be discouraged by educating local communities and farmers, and safe deterrents may be recommended.

7.2 ADDRESSING THE HEALTH AND WELL-BEING OF RHESUS MACAQUES DURING CAPTURE AND POST-CAPTURE OPERATIONS

- The incomplete capture of a macaque troop leads to disruption of the social dynamics and group bondings. So this may be avoided during a capture operation.
- When capturing using cages, the following is to be considered:
 - The design of cages and their transportation is vital for ensuring the well-being of the captured individuals.
 - Captured individuals may be allowed to settle down and remain calm and undisturbed. They may be protected well from direct sunlight, environmental extremes and predators. Utmost care should be taken to avoid undue stress or injury to these individuals.
- Post-capture health examination and monitoring of captured Rhesus Macaques should be done by veterinarians. The physiological parameters (temperature, respiration, pulse rate and colour of mucous membrane) may be monitored constantly.
- Any significant deviation from normal physiological parameters may be medically dealt with appropriately.
- After capture, more detailed examinations may be carried out.

- There are various options for crating and transporting captured macaques. These include transporting the animals in specially designed vehicles or large containers, if the distance is great, and on foot, if the distance is small.
- Major concerns in the design of transportation vehicles include adequate ventilation options (containers) and provision of drainage to facilitate disposal of wastes.
- Transportation from the capture-site to the sterilisation centre/holding facility may be completed quickly and with minimal stress. Individual cages should be of adequate size to allow a macaque to turn around and adjust its posture. The cages may be slightly elevated above the ground to allow the passage of urine and faeces. They may be protected from environmental extremes for the duration of the transport period.
- To avoid trauma during transport, macaques should be not be caged together, except for known family groups, mothers and infants, and young animals. Aggressive males to be housed separately to avoid infighting and injuries due to transport stress.
- Injured individuals may be given basic on-site treatment. Unconscious individuals may be placed in a lateral or sternal recumbent posture and shifted to a transport container immediately.
- Rhesus Macaques anaesthetised after major injuries may be transported only after they have fully recovered. Partially anaesthetised macaques can easily trip over themselves inside a cage. This may lead to respiratory obstruction and eventually death. Inhalation of vomit or regurgitated stomach contents/food in cheek pouch can also occur in an anaesthetised or partially anaesthetised macaque during transport, leading to respiratory obstruction or inhalation pneumonia.
- A macaque may be regularly monitored by an experienced veterinary professional for signs of discomfort or stress during the entire journey.
- It is better to avoid provisioning feed and water during transport. Efforts may be made to reach the destination (sterilisation facility/holding facility near release site/rescue centre) as soon as possible, taking due care of the vehicle speed and halting stations. When a single stretch of a journey is more than six

hours long, especially during hot days, water may be also be kept ready and handy to control possible hyperthermia of recumbent animals.

- Opportunities for establishment of need-based multiple Monkey Rescue Centers with health care facilities / life-time care facilities, may be explored.

7.3 ADDRESSING THE HEALTH AND WELL-BEING OF RHESUS MACAQUES DURING A RELEASE

- The health of a captured/immobilised macaque may be monitored after sterilisation as welfare and well-being are most important aspects during translocation and release at suitable sites.
- The release sites may have proper off-loading facilities, and the release may be done with the least possible stress to the macaques.
- In case the animals should be kept in captivity, they may be held in a rescue facility. This will provide the animals the chance to recover from anaesthetic drugs besides helping them to get acclimatised to their surroundings at the new location. This will also provide opportunities for the authorities to undertake intensive monitoring and veterinary management schedules.
- In case a Rhesus Macaque is to be kept in captivity, the space provided to the macaque should be as per the CZA guidelines⁹.
- Proper sanitation and hygiene should be maintained to avoid chances of infections and any zoonotic diseases.
- Adequate, balanced food and water may be made available, along with mineral and vitamin supplements, according to the health status of the macaques.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK RELATING TO HRMC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback arising from their implementation.

- The feedback arising from the use of these guidelines may, therefore, be consolidated to form the basis

for fine-tuning these mitigation measures and for understanding capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further reviewing the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed that consisted of independent wildlife policy experts and representatives of Government agencies, SFDs, research institutions, civil society institutions and international organisations. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology¹⁰. The experts played different roles in the drafting and editing process (Coordinating Lead Authors, Lead Authors, Contributing Authors, Review Editors). The Author Group worked on developing these guidelines between July 2019 and August 2021, during which time they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the existing documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. A National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and independent wildlife and

policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and the HWC-NAP. Detailed terms of reference were provided, and meetings and workshops of the author groups were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using structured processes and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this to happen, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years from

2023 onwards. However, a mid-term review process may be desirable in 2024. In the long term, the review cycle of these guidelines can be aligned with that of HWC-NAP.

- The mechanism, templates and guidance for collating information and feedback on the use of these guidelines may be developed.

10 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Ministry of Environment, Forest and Climate Change
Government of India
2023



Government of India



Guidelines for Mitigating Human–Wild Pig Conflict

Taking a Harmonious–Coexistence Approach



Ministry of Environment, Forest
and Climate Change,
Government of India, 2023

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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Mitigating Human—Wild Pig Conflict

Taking a Harmonious—Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	IUCN	International Union for Conservation of Nature
CWLW	Chief Wildlife Warden	JFM	Joint Forest Management
CZA	Central Zoo Authority	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
DBT	Direct Benefit Transfer	NDRF	National Disaster Response Force
DFO	Divisional Forest Officer	NGO	Non-governmental organization
DLCC	District-level Coordination Committee	NTCA	National Tiger Conservation Authority
DNA	Deoxyribonucleic acid	NTG	National Technical Group
EIA	Environmental impact assessment	NWAP	National Wildlife Action Plan
EWRR	Early Warning and Rapid Response	OPs	Operating procedures
GIS	Geographical information system	PA	Protected area
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PCCF	Principal Chief Conservator of Forest
Gol	Government of India	PPE	Personal protective equipment
HOFF	Head of Forest Force (in a state)	PRT	Primary Response Team
HWC	Human–wildlife conflict	RFID	Radio frequency identification
HWC-MAP	Human–Wildlife Conflict Management Action Plan	RRT	Rapid Response Team
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SDRF	State Disaster Response Force
HWPC	Human-Wild Pig Conflict	SFD	State forest department
HWC-SAP	State-level HWC Mitigation Strategy and Action Plan	SHG	Self-help group
IFS	Indian Forest Service	SLCC	State-level Coordination Committee
		SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Acknowledgments	ii
Abbreviations	iv
Contents	v
1 About the Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	6
1.4 Legal and policy framework for implementing the guidelines	6
1.5 Institutional framework for implementing the guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of HWPC	8
3.1 Zonation	8
3.2 Monitoring and managing habitat-related drivers and pressures	8
3.3 Measures to strengthen cross-sector cooperation to be institutionalised	9
3.4 Scientific management of Wild Pig population at interface areas	9
3.5 Sustainable garbage management around protected areas and at HWPC hotspots	10
3.6 Systematic research and monitoring addressing HWPC	10
3.7 Measures to strengthen the system of knowledge management in HWPC mitigation	11
4. Deploying Measures to Prevent Human–Wild Pig Conflicts	11
4.1 Mapping HWPC hotspots and monitoring the populations at hotspots	11
4.2 Support local communities in crop protection measures	12
4.3 Effective use of the rapid response teams and awareness measures	13
4.4 Scientific management of population at HWPC hotspots	13
4.5 Addressing zoonotic and other emerging diseases, adopting a one health approach	15
5. Addressing the Emergency Situations Arising due to HWPC	14
5.1 Establishment of emergency response mechanism	14
5.2 Intra- and inter-agency coordination and cooperation	14
5.3 Preparedness of response teams	14
5.4 Action at the onset of an emergency or specific situation	14
5.5 Key response actions during and after an emergency	14
6. Reducing the Impact of HWPC on the Health and Overall Well-being of Affected Humans	15
6.1 Addressing the situation of loss of human life	15
6.2 Addressing the situation of injury/loss of livestock	15
6.3 Addressing the situation of crop/property damage	15
7. Reducing the Impact of HWPC on the Health and Well-being of Affected Wild Pigs	16
7.1 Overall measures	16
7.2 Addressing the health and well-being of wild pigs during capture and translocation	16
8. Use of Learnings from the Guidelines to Further Strengthen Institutional and Policy Framework Relating to HWPC Mitigation in India	17
9. Process of Development, Pilot-Testing of These Guidelines and the Consultation Process	17
10. Monitoring and Evaluation of Guidelines	17
Annexe 1	18
National Technical Group (NTG)	18
Working Group on Pilot Implementation of Guidelines and HWC-NAP	18
Author Group for drafting the guidelines	18

1.1 THE OVERALL CONTEXT

- These guidelines get their overall context from the Wild Life (Protection) Act, 1972 (WPA), the Advisory to Deal with Human–Wildlife Conflicts (HWC) (F. No. 8-60/2020 WL (Part-1)) (MoEF&CC 2021) and the National Human–Wildlife Conflict Mitigation Strategy, National Wildlife Action Plan (2017-35)¹ and National Human–Wildlife Conflict Mitigation Strategy and Action Plan of India (2021–26) (HWC-NAP)². The HWC-NAP provides the overall conceptual and institutional framework for implementing these guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good practices on human–Wild Pig conflict (HWPC) mitigation issued by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and advisories and standard operating procedures (SOPs) issued by various state forest departments (SFDs) and builds on them to bring about a more holistic approach to HWPC mitigation.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach..
- In addition to the HWPC mitigation guidelines, following guidelines are to provide guidance on other selected species: guidelines for mitigating human–Elephant, –Leopard, –Gaur, –Snake, –Crocodile, –Macaque, –Blue Bull, –Bear and –Blackbuck conflicts.

1.2. PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HWPC in India, leading to co-existence, and to ensure standardisation in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and Wild Pigs.
- The guidelines provide advice on mitigation measures to be used to address HWPC in the long term, as well as to facilitate the development, assessment, customisation and evaluation of site-specific HWPC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HWPC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HWPC mitigation and are not limited to state forest departments (SFDs).
- The guidelines will be able to bring in more effectiveness and efficiency when they are fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.5 INSTITUTIONAL FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed for implementing these guidelines.

1 MoEFCC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021–26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 ‘Harmonious coexistence’ is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human–wildlife interactions on humans or on their resources and on wildlife or habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans in which the two are given equal importance. The overlap in space and resource use is managed in a manner that minimises conflict.

4 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence approach³ to ensure that both humans and Wild Pigs are protected from negative impacts of HWPC.
- The guidelines address the issue of HWPC, taking a holistic approach. The holistic approach of the guidelines entails not only addressing the emergency situations arising due to immediate conflict situations but also addressing the drivers and pressures that lead to HWPC; providing guidance on establishing and managing prevention methods; and reducing the impact of conflict on both humans and Wild Pigs.
- The development of these guidelines and their intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HWPC mitigation measures with key sectors and stakeholders at the national, state and local levels.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementers through provision of *Implementer's Toolkit*, which includes Operating Procedures (OPs), formats, checklists, and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wildlife (Protection) Act, 1972. The following legislations are considered directly relevant for conservation when dealing with HWPC:
 - Wildlife (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HWPC.
- Other important laws that facilitate conservation when dealing with HWPC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; and Disaster Management Act, 2005.
- The Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India⁴ may be referred to for more details on the specific legal provisions for HWC mitigation.

2. CONTEXT AND SITUATION

The Wild Pig (*Sus scrofa*) is a classical example of a multi-speciality ecosystem engineer. It ploughs, disperses seeds, forms an important prey base for large carnivores and plays an important role as a scavenger. No other species has this combination of specialisations. The presence of the Wild Pig is an indication of the true functional value of an ecosystem. The high rate of reproduction and widespread distribution of the Wild Pig helps maintain these functions in the different types of ecosystem that it is found in.

The Wild Pig is one of the most abundant and widely distributed large-sized omnivorous ungulates. The Wild Pig is categorised as a Least Concern species by the IUCN Red List. In India, it is distributed everywhere except in the upper Himalaya and in the desert areas of Gujarat and Rajasthan. Since the Wild Pig populations in most states within India have not been enumerated or estimated regularly, there is very little information about the population or status of the species.

Human-Wild Pig conflict (HWPC) refers to the negative interaction between humans and Wild Pigs, leading to adverse impacts, such as injuries to humans, loss of human lives, crops, livestock and other properties or even impacts on the emotional well-being of humans and to the equally negative impacts on Wild Pigs and/or their habitats.

The Wild Pig's highly adaptable nature, along with its capacity to cope with landscape changes, and alterations

of habitats, allows its populations to survive and thrive in human-dominated landscapes. An increase in the number and intensity of instances of Wild Pigs foraging on crops is an indicator of an increasing local Wild Pig population. With the availability of a variety of food resources, and high fecundity rates, a Wild Pig population can multiply at a rapid rate. Food crops and waste dumps aid the growth of Wild Pig populations. Another reason for the increase in Wild Pig populations in recent years is also linked to declining or low populations of natural predators and consequent increases in HWPC. Habitat loss and fragmentation are the major threats faced by the species.

Wild Pigs are among the most aggressive and persistent crop foragers. Wild Pig populations close to agricultural areas have become dependent on crops and agricultural produce. Human food waste also contributes to their increasing presence in forest-fringe areas. Humans also get injured when they encounter Wild Pigs accidentally. Isolated cases of Wild Pigs interacting negatively with livestock and causing injuries, and in rare cases death of livestock, have also been reported.

A key factor of HWPC may be the availability of only a limited number of effective mitigation measures. Therefore, the desired solution may involve a holistic approach that addresses the drivers and pressures, along with effective preventive measures, while reducing the vulnerability of local communities and Wild Pigs.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HWPC

A systematic analysis of HWPC mitigation measures may be carried out to assess their effectiveness and wildlife-friendliness in different types of conflict situation. This will facilitate the customisation and adaption of mitigation measures/combining of two mitigation measures necessary to achieve the best possible impacts in the field.

3.1 ZONATION

Wild Pigs are often found frequenting agricultural lands on the periphery of protected areas or forested areas. Within a forest zone, Wild Pigs usually avoid interactions with humans. It is in the human-use areas and forest-village interface zone, i.e. forest fringes and agricultural settlements, that most of the HWPC cases are reported.

The following zonation takes into consideration the resources available and allows a science-based pragmatic approach to landscape-level planning for conservation and HWPC mitigation.

Zone 1 – Wild Pig habitat zone: This zone is in forested areas, and hence management interventions need to address and prevent habitat fragmentation and degradation. Humans venturing inside the forest may also encounter Wild Pigs, leading to aggression by the animals. In fragmented and degraded forest areas, habitat improvement activities such as reduction of biotic pressures and planting of native (forage) plants and vegetation cover for Wild Pigs may be carried out so that their existing forest populations are sustained. Further, identification of areas used by sounders for foraging, resting, etc. needs to be completed and activities that cause disturbances curtailed.

Zone 2 – Village–forest interface: Most of the Wild Pig populations in this zone are involved in agricultural losses and injuries or losses sustained by livestock and humans. There is an active need to manage the Wild Pig population in this zone. The SFD may work in close cooperation with local communities to achieve this as village panchayats are active stakeholders here. Most of the mitigation measures, such as barriers, fencing and other preventive measures, may be taken up in this zone. Long-term scientific management of Wild Pig population may also be planned for this zone.

Zone 3 – Wild Pig exclusion zone: In this zone, Wild Pigs live in refuges within agricultural fields away from forests. These Wild Pigs have adapted well to humans and live in patches of wasteland, village forests or agricultural fields. These populations have almost lost their connection

with the adjoining forests. They have become entirely dependent on agriculture fields and waste dumps. Here they are joined by feral pigs, and frequent interbreeding is the norm. Scientific population management is most urgently required at these locations.

3.2 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

Habitats suitable for Wild Pigs are not uniformly distributed everywhere in a forest, as a result of which these animals are active foragers of the forest floor. Moreover, Wild Pig resource preferences may vary from region to region. Further, habitat loss, fragmentation and degradation are some of the primary reasons why many wildlife species move out of natural habitats towards resource-rich human-use areas when searching for food. There has been a widespread loss of forests to the expansion of agriculture and plantations and increasing human habitations. With such forest losses, the original Wild Pig habitats have also disappeared or have been fragmented.

- Refuge areas inside villages, or nearby, support populations of both Wild Pigs and their hybrids. Thus, all Wild Pig habitats, whether within forests or refuge areas in villages, may be monitored regularly. The existence of a Wild Pig refuge in a village forms a source of HWPC. Thus, efforts may be made to reduce or remove the Wild Pigs from such habitations.
- In forested areas, critically important Wild Pig habitats such as foraging areas, resting areas and scrub forests may be monitored. Uncontrolled non-timber forest produce (NTFP) collection may lead to degradation of the forest habitats. All such collection may be monitored annually. The SFD may also collect data on the amounts/weights of different NTFP collected from different forest beats as these are good indicators of extraction levels.
- Due to the dominance of invasive alien plant species (weeds) that out-compete native vegetation for space, there may be a reduction in the native palatable woody shrub cover and suppression of native tree species. In time, with competition between humans and Wild Pigs for forest resources, these changes may result in increased HWPC. SFDs may map and monitor the invasive species cover and abundance in the landscape periodically and make further plans for invasive species removal accordingly.

- Unsustainable extraction of NTFPs, especially fruits and nuts (natural food items of Wild Pigs), leads to a decrease in the overall resource availability and particularly the ability of Wild Pigs to sustain themselves inside forested habitats. Overexploitation and unscientific harvesting of NTFPs decrease the regeneration and productivity of natural forests. Apart from affecting the foraging habitat of Wild Pigs and other wildlife, it also leads to a gradual loss of livelihoods for forest-dwelling communities. The primary objective of any management intervention may be to bring about better livelihood opportunities and reduce the dependence of humans on forest biomass.

3.3 MEASURES TO STRENGTHEN CROSS-SECTOR COOPERATION TO BE INSTITUTIONALISED

Cross-sectoral cooperation for HWPC mitigation entails engagement of multiple stakeholders from different sectors and domains at the state level, at the landscape level and at the forest division/district level. Key stakeholders of HWPC mitigation include the SFD, the Agriculture Department and other institutions under the agriculture sector, the district administration, the Animal Husbandry Department, the Health Department, the Family Welfare Department, the Education Department, local schools and colleges, local hospitals, wildlife conservation and development NGOs, farmers' cooperatives and agricultural research and extension institutions.

- State-level coordination committees (SLCC), a landscape-level multi-stakeholder forum and district-level coordination committees (DLCC) may be used to strengthen the inter-agency coordination required for HWPC. A district-specific operational mechanism may be developed to address specific needs of HWPC mitigation.
- Safety audits⁵ focusing on crop protection measures may be conducted each year, if feasible, to ensure that all act responsibly and to facilitate inter-agency cooperation.
- Coordination between the forest and agriculture sectors is important, and dedicated programmes at the national, state and district levels may be formulated to implement these guidelines effectively.

- Workshops, dialogues and training programmes for the local community, especially members of the PRI institutions, may be organised at all HWPC hotspots to ensure that there is a common understanding of the gravity of the situation when the option of scientific population management is to be exercised.

3.4 SCIENTIFIC MANAGEMENT OF WILD PIG POPULATION AT INTERFACE AREAS

A local overabundance of wildlife, including Wild Pigs, could be due to a reduction in the carrying capacity brought about by habitat loss and degradation and fragmentation of natural habitats. It could also be due to a rapid growth in the population. Or it could be a combination of both. It is therefore important to determine which factor is driving the overabundance so that the appropriate interventions can be selected.

- Managing a local overabundance of Wild Pigs requires good knowledge and data on population size, dynamics, ranging of various sounders, habitat variables, HWPC, etc.
- SFDs may work towards building both internal capacity and collaborations with research institutes and researchers to achieve the high standards of data collection and analysis needed for scientific population management. SFDs may adopt a robust population monitoring protocol and implement it using trained field staff members or in collaboration with research institutes or local universities/colleges.
- Naturally dispersing Wild Pig populations that have colonised new areas may be studied to assess if the knowledge obtained can translate into any viable solution or clues for scientific population management. Past dispersal may be reviewed in terms of injuries or losses of human lives, crop or property damage and other adverse impacts on the well-being of humans in and around the newly colonised sites, losses of Wild Pig lives (including captures) and Wild Pig population trends in terms of the management inputs and challenges faced.
- Wild Pig populations occupying plantations or farms may be translocated to a suitable area, where they can be monitored closely by SFD staff members.

⁵ A safety audit is a process for pro-actively and periodically evaluating the mitigation measures in place at a site for their effectiveness and wildlife-friendliness.

3.5 SUSTAINABLE GARBAGE MANAGEMENT AROUND PROTECTED AREAS AND AT HWPC HOTSPOTS

Food waste dumped close to forest edges is a major attractant to many wild herbivore and omnivores species, which are closely followed by the carnivores that prey on these. The Wild Pig is one species that is attracted to these high-energy food resources. Food waste dumps support very high numbers of Wild Pigs, which move into cultivated and non-cultivated areas of villages. Human-use areas lacking wild predators also support an unrestricted growth of Wild Pig populations. Sustainable garbage management is thus an effective measure in controlling the populations and movements of Wild Pigs within human-dominated landscapes.

- Village panchayats on forest fringes may ensure that garbage dumps are not located close to the forest edges and that there are ecologically sound garbage storage and disposal plans. Wild Pig access can be prevented by covering dumps and maintaining locked garbage dumps.
- When landfills are used for disposal, their designs may not only be sanitary but secure too. Landfill designs may incorporate environmental planning to ensure wildlife protection. A landfill may be securely fenced to exclude animals.
- Another environment-friendly way of reducing dumps would be to allow recycling of most of the material. Packaging materials and plastics contribute immensely to the bulk of the waste. Improvements in packaging materials and package disposal may be explored by the village panchayats and municipal councils.
- Some Wild Pigs have become habituated to foraging within the boundaries of villages and towns in their search for garbage or waste dumps. 'Aversion conditioning' may be tested to discourage this behaviour of Wild Pigs.
- The vegetable and food waste generated in weekly markets and food waste and garbage thrown along roads and railway lines passing through forests all attract Wild Pigs and other animals. SFDs may coordinate with the local administration for the overall organisation of such markets, waste management and disposal in such a way that the waste generated does not attract Wild Pigs.
- The importance of using public toilets may also be included in the community awareness programmes conducted for the villagers living close to the forests in order to minimise the risk to life. SFDs may coordinate with the local sanitation department to get toilets built (under the *Swachh Bharat Mission*), including proper drainage mechanisms, particularly at conflict hotspots.

3.6 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HWPC

Data on the populations and distributions of Wild Pigs are very scarce. Data are only available from a few isolated protected areas, in the form of encounter rates or density estimates. Thus, there is an urgent need to assess Wild Pig populations, particularly in areas close to conflict hotspots.

- Monitoring is essential to establish the trend in the Wild Pig population of an area. Apparent indirect signs of Wild Pig activity such as rooting, dung and hoof marks may be used to record the presence/relative abundance of Wild Pigs in an area. The various methods adopted for Wild Pig population monitoring include sign surveys, tracking plots, capture–recapture methods using camera traps and E-eye.
- Population monitoring of Wild Pigs may be conducted mainly in agricultural and forest-fringe habitats. It will be useful to assess the populations at the hotspots regularly, particularly before and after the implementation of mitigation measures. In the future, such population estimation may be a major deciding factor in allowing scientific population management of overabundant Wild Pig populations.
- For effective long-term scientific population management, and identification and selection of appropriate sounders within the conflict hotspot, information about their home range, habitat use and ranging patterns is critical.
- For any assessment of a species (and populations) at any (local/regional) scale, it is essential that baseline information be generated on the status and distribution of the species and its interactions with various (human and non-human) communities. Camera-trap monitoring, not only in protected forests but also at their interface with agricultural areas and even selected vantage spots in agricultural fields, may provide a more detailed and better estimate of the Wild Pig population and a better understanding of the behavioural ecology of the species.
- Systematic monitoring is also needed at hotspots or crop-foraging zones to study the intensity of conflict, crops affected (qualitative/quantitative), distance from forest/refuge, group size/composition of crop-foraging Wild Pigs, etc. to assess conflict intensity levels at various sites and prioritise sites for conflict mitigation.
- The current Wild Pig population densities at a hotspot, the demographic structures of various populations and general behaviour may be thoroughly quantified before any scientific population management intervention is attempted. Wild Pig movements and ranging patterns,

the reproductive behaviour of the animals and their age–sex ratios over time also need to be examined throughout the country.

- To monitor trends and the efficacy of the *ex gratia* payment, data may be collected and analysed in collaboration with other stakeholders, as appropriate.

3.7 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT IN HWPC MITIGATION

- To ensure that HWPC mitigation measures are effective, wildlife-friendly and sustainable, it is essential that field experiences, learnings, field-evidence and conceptual advances, especially related to crop protection measures, be not only shared between key stakeholders and landscapes but also documented to be utilised for future strategies and plans related to HWPC mitigation.

- Landscape-level multi-stakeholder fora and appropriate working groups may be used to share field experiences, learnings, evidence and conceptual advances within the Forest Department, between stakeholders and across landscapes.
- Measures may be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances related to HWPC mitigation to inform future strategies and plans.

4. DEPLOYING MEASURES TO PREVENT HUMAN–WILD PIG CONFLICTS

4.1 MAPPING HWPC HOTSPOTS AND MONITORING THE POPULATIONS AT HOTSPOTS

HWC hotspots are areas with actual or predicted repeated occurrences of HWC incidents that result in crop-loss, livestock death, human death and injury, and wildlife death and injury over temporal and spatial scales.

- Identifying conflict hotspots that could also provide a direction towards the drivers of conflict is critical for providing site-specific solutions for mitigating human–Wild Pig conflict. HWPC hotspots may be mapped through geospatial assessments by using both primary and secondary data, including time-series data. The hotspots can be identified and mapped as follows:
 - **Incident hotspot:** Frequency of occurrence of incidences over a specific period (such as previous 5 or 10 years), mapped over the target area. The data include the number of incidences of crop and livestock injury and loss, injury and death of humans.
 - **Vulnerability hotspot:** Cumulative index determined by overlaying past incidents, the vulnerability of the local community and the potential risk of the area.

It may not be feasible to attempt individual identification of a Wild Pig in a conflict situation beyond getting evidence (such as digging, uprooting, trampling or news on aggressive interactions with livestock or humans) of crop foraging by Wild Pigs. Therefore, mitigation measures may not be based on the individual-animal approach.

- Groups of Wild Pigs-in-conflict, when identified, may be characterised as casual (opportunistic) foragers or as repeated (obligatory) crop foragers.
 - Opportunistic foragers may be Wild Pigs in their natural range occasionally crossing the periphery of the forest into croplands, while obligatory foragers are Wild Pigs that exclusively inhabit croplands due to the sustained attractions.
 - Another way of identifying a group-in-conflict is by checking if particular populations are habituated to foraging particular sites/locations. This could help decide if relocating a sounder-in-conflict, if feasible, to another place, should be resorted to.

- The following steps may be taken to identify Wild Pig groups-in-conflict:
 - The movement area of the above-mentioned categories of Wild Pig within croplands may be first demarcated or mapped, including track-marks and other distinct signs, to confirm the presence and absence of Wild Pigs.
 - Investigate all conflict-related incidents within the region.
 - Deploy a number of cameras at strategic locations, if feasible and depending on the predicted movements of Wild Pig groups under observation.
 - Investigate the existing camera trap photo database, if available, and attempt to identify known individuals on the basis of any distinct morphological identification features. Prepare a short list of Wild Pigs for capture on the basis of frequency of occurrence of conflicts.

4.2 SUPPORT LOCAL COMMUNITIES IN CROP PROTECTION MEASURES

Education and awareness programmes may be carried out to sensitise the communities to using wildlife-friendly crop protection measures and to the need for continuous improvisation.

- Since historical habitat fragmentation and loss are very difficult to address, the most suitable mitigation measures for mitigating HWPC are effective crop protection measures, including fencing and crop guarding, to prevent Wild Pigs from venturing into croplands.
- Collaborative efforts by the SFDs and the agriculture sector, using new technology, are required to develop innovative crop protection measures.
- Traditional barriers, such as rubble stacks, rubble walls are chain-linked fences, may be used as Wild Pig-proof barriers. The raw materials needed for making such barriers are easily available and such barriers are effective in preventing other wildlife species as well.
- More recently developed barriers such as buried metal fences, diamond mesh grills, concrete fencing and solar fencing may be used for enhanced effectiveness. Seasonal/temporary fencing may be explored as an alternative, as permanent barrier fences may interfere with many ecological processes.
- As animals such as Wild Pigs may get habituated to deterrents quickly, there is a need to keep improvising and changing deterrents, along with the regular crop-

guarding methods used by the community. Mixing and alternating methods randomly may also be tried so that the Wild Pigs do not get used to any particular method easily.

- There are other exclusionary devices and methods also that may be used to prevent Wild Pigs from entering the crop fields:
 - Visual (colourful, shiny plastic ribbons) or acoustic deterrents
 - Scare devices (beating of drums or empty tins)
 - Planting of thorny bushes around the crop area (Euphorbia, Opuntia, Agave species)
 - Coconut ropes soaked in olfactory deterrents

4.3 EFFECTIVE USE OF THE RAPID RESPONSE TEAMS AND AWARENESS MEASURES

HWPC mitigation usually does not necessitate the involvement of Rapid Response Teams, except in situations where mass capture and rehabilitation are required. Having well-functioning Community PRTs can help address the situation.

- Community PRTs and RRTs may hold regular meetings, along with village panchayats and municipal councils, for reviewing the HWPC and for joint preparedness to handle any large-scale HWPC exercise in the future.
- Community PRTs or personnel from the affected community may be suitably trained in humane aversion or driving techniques and provided with support to implement the same in their localities whenever required.
- Besides involving local communities and various stakeholders in mitigation of HWPC, making them aware of Wild Pig behaviour is extremely important to avoid any accidental encounters.
 - Creating awareness and presenting demonstrations of effective Wild Pig-proof fences through institutions for effective HWPC mitigation
 - Encouraging communities to change cropping patterns or growing crops that are not preferred or are less preferred by Wild Pigs, or even combinations of crops (growing preferred ones in rows or guarded by non-preferred crops) conflict hotspots.

4.4 SCIENTIFIC MANAGEMENT OF WILD PIG POPULATION AT HWPC HOTSPOTS

Effective mitigation measures along with capture at HWPC hotspots can reduce the impacts on crop fields.

Mitigation measures leading to elimination of Wild Pig populations from a landscape with natural habitats may not be beneficial for the health and stability of the overall agro-ecological system in the landscape. Such measures may be implemented at forest-fringe areas and human-dominated landscapes only after long-term studies have been conducted and field-evidence of the possible ecological impacts has been collected.

Site-specific solutions are required, depending on whether the Wild Pig population comes from the adjoining forests or is resident entirely on the farmland. The population connected to a forest may be a part of the prey base of the predators inhabiting the natural forest. Therefore, any mitigation measure that results in a significant reduction of the Wild Pig population may affect the predator population as well.

In addition, another factor that could determine the nature of the mitigation measures is whether the population consists of small isolated herds or it is a large contiguous population occupying a large area.

4.5 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH

Handling wild animals invariably involves a zoonotic risk. Wild Pigs adapt to different types of habitat and forage on different types of food, in addition to their behaviour of alternating between forested and human-use areas, leading to disease transmission.

- It is also important that transmission of diseases from domestic animals and feral pigs to Wild Pigs and eventually to other wild animals in the forests be prevented by reducing the interactions of these animals.
- The veterinary capacities and infrastructure may be upgraded to facilitate disease-monitoring in Wild Pig populations for conservation and for prevention of the spread of zoonotic diseases to livestock and human populations.
- A well formulated Wildlife Health Management and Disease Surveillance Plan may be in place at every division/protected area.
- All the personnel involved in capture operations may be trained, vaccinated and equipped.
- The basic approach may be to integrate the concept of One Health⁶, which links human and animal health in a shared environment, into all the operations and HWPC mitigation measures in the field.

⁶ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HWPC

Emergency or crisis situations can be defined as situations that are sudden and unexpected, have the potential to be serious in nature and therefore require immediate interventions in time and space from concerned stakeholders to minimise the loss of lives and assets.

This is an indicative list of potential emergency situations:

- A Wild Pig has killed/injured a person.
- A Wild Pig has damaged property/crops.
- A Wild Pig has entered a human-use area (agricultural field or settlement area).
- A Wild Pig has been injured or has died due to retaliatory action.

Key response procedures may be established, and actions may be promptly implemented for addressing emergency situations. Detailed step-by-step guidance may be developed as 'Operating Procedures for Addressing Emergency response Situations'.

The key emergency response procedures may include the following.

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

- A robust mechanism to promptly trigger an emergency response may be established in all HWC hotspots. The mechanism may include early detection of the incident to communication with key officials and information dissemination for initiation of appropriate response actions at the site.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Procedures may be laid down in each HWPC hotspot, in line with these guidelines, and in line with the institutional framework suggested under the HWC-NAP, to ensure timely coordination amongst the various response teams (the Forest Department, Agriculture Department and agricultural institutions, District Administration, the Police, the fire services, the Animal Husbandry Department, the Health Department and the local community, especially local panchayat leaders and community PRTs).

5.3 PREPAREDNESS OF RESPONSE TEAMS

- Detailed operating procedures may be laid down to ensure that various response teams (community PRTs, RRTs) are adequately established and they are facilitated in their capacity development through training and other measures, including training sessions on occupational health and safety.

5.4 ACTION AT THE ONSET OF AN EMERGENCY OR SPECIFIC SITUATION

- Operating procedures may be laid down to receive, channelise and disseminate information at the onset of any emergency from the site of the incident to related forest officials and the HWC Mitigation Hub. The information may be disseminated further to requisition a related response action at the emergency site.

5.5 KEY RESPONSE ACTIONS DURING AND AFTER AN EMERGENCY

- Operating procedures may be laid down, in line with the other guidelines issued by MoEF&CC, for stepwise key actions, for all emergency situations, media engagement, crowd management, addressing health emergencies and post-response operation for management of the animal. This includes ensuring the animal's health and safety during capture, transport, selection of a translocation site and monitoring the animal after the animal is released safely into the wild.

6. REDUCING THE IMPACT OF HWPC ON THE HEALTH AND OVERALL WELL-BEING OF HUMANS

6.1 ADDRESSING THE SITUATION OF LOSS OF HUMAN LIFE

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family should be made into their bank accounts.
- In the HWPC hotspots, a revolving fund may also be established, at the division-level, to ensure that funds are available for providing immediate relief to the victim/family.

6.2 ADDRESSING THE SITUATION OF LOSS OF LIVESTOCK

Loss or injury of livestock due to HWPC is occasional or rare.

- A livestock insurance scheme, additionally covering accidental injury or death from interactions with Wild Pigs, as with wild carnivore species may be facilitated by the SFD, in collaboration with the Animal Husbandry Department. Livestock loss may also be compensated by replacement with good-quality high-yielding livestock if adequate funds are available.
- Stall-feeding of cattle may also reduce their venturing into the forest and encountering wild animals such as Wild Pigs. Besides reducing the chances of loss of livestock to wild carnivores, stall-feeding also reduces the spread of zoonotic diseases from wild populations to domestic animals.

6.3 ADDRESSING THE SITUATION OF LOSS OF CROP/PROPERTY

Key manifestations of HWPC is damage to crops, property (damage to fences, houses, etc.) and other assets (livestock injury/death). Rarely, encounters may lead to human injury or death. The crop damage due to Wild Pig activities varies from state to state. Therefore, different measures may be implemented as per the situation:

A wide range of approaches could be envisaged that encourage local communities to live and prosper in a Wild Pig habitat. These approaches may be based on the principles of co-existence, co-management, participatory planning, risk assessment, strategies used to change perceptions, poverty alleviation programmes, community-based natural resource management and other forms of stakeholder engagement.

- Collaborative efforts may be made to promote market-based arrangements for alternate crops, wherever feasible. Community PRTs may be engaged to facilitate this process in their respective villages/areas of operation.
- The process of settling *ex gratia* payment for crop or property loss should be transparent and simplified.
- Mobile apps should be used for collecting the information and processing the claims of farmers related to crop damage caused by Wild Pigs to ensure that there is efficiency and transparency in the system.
- Farmers may be encouraged and facilitated through community-based institutions to explore solutions such as changes in cropping patterns and the use of crops that are non-palatable to Wild Pigs.
- Site-specific studies may be conducted in collaboration with agricultural research institutes to find appropriate crops that are non-palatable to Wild Pigs, and for finding effective crop guarding methods.
- The Ministry of Agriculture and Farmers Welfare has included crop depredation by wild animals under its flagship scheme, Pradhan Mantri Fasal Bima Yojana (PMFBY). This scheme may be used as an important HWPC mitigation instrument.
- Dialogue may be initiated with the insurance sector for providing insurance cover for damage due to HWPC. Insurance can be considered for damage to standing crops besides injuries/loss of life sustained by human beings. The modalities may vary for such insurance from place to place according to the assessment of risk by the insurance companies. The feasibility at the state level may also be explored.

7. REDUCING THE IMPACT OF HWPC ON THE HEALTH AND WELL-BEING OF WILD PIGS

7.1 OVERALL MEASURES

All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Articles 48A and 51A(g)) and the statutory provisions of the Indian Penal Code (Sections 428 and 429), the Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), the Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.

7.2 ADDRESSING THE HEALTH AND WELL-BEING OF WILD PIGS DURING CAPTURE AND TRANSLOCATION

Translocation of captured Wild Pigs to a new location can also translocate the HWPC to that location if the governing factors are not kept in mind. Therefore, decisions relating to release sites may be based on scientific data (e.g., an area where the species is not present should thus be avoided; areas where other populations of the Wild Pig are present should be reviewed).

The decision about translocation, lifetime care or the use of any scientific population management method on captured Wild Pigs needs to be taken much before the capture operation, ideally at the planning stage itself.

- All captures may be planned and executed with utmost care as these procedures carry the risk of injury to both the animals and the handler/staff members involved.

- Driving (herding) and loading methods may be standardised through repeated testing.
- The capture equipment should be manufactured or procured as per specifications provided by the MoEF&CC or the relevant national institutions. Field staff should be trained in the use and regular maintenance of the equipment. Customised vehicles may be designed for transporting captured Wild Pigs immediately from the capture site to a rescue centre/lifetime care or translocation site.
- If captured animals are released in the wild, they may be marked for identification (using RFID tags, if available and feasible), and all encounters may be recorded and reported to a central database. If the number of translocated animals is large (100 or more), a monthly assessment of the numbers released may be made to ascertain the status of the population. Identification-marking during the release may facilitate post-capture monitoring for getting information for decision-making mitigation measures.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN INSTITUTIONAL AND POLICY FRAMEWORK ON HWPC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback arising from their implementation.

- The feedback arising from the use of these guidelines may, therefore, be consolidated to form the basis for fine-

tuning these mitigation measures and for understanding capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further review of the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT-TESTING OF THESE GUIDELINES AND THE CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed that consisted of representatives of Government agencies, SFDs, research institutions, civil society institutions and international organizations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology⁷. The experts played different roles in the drafting and editing process (Coordinating Lead Authors, Lead Authors, Contributing Authors, Review Editors). The Author Group worked on developing these guidelines between July 2019 and February 2022, during which time they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into this new document. A National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and

independent wildlife and policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and the HWC-NAP. Detailed terms of reference were provided, and meetings and workshops of the author groups were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using structured processes and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this to happen, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of these guidelines is planned to take place every 5 years from

2023 onwards. However, a mid-term review process may be desirable in 2024. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- The mechanism, templates and guidance for collating information and feedback on the use of these guidelines may be elaborated.

⁷ Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Ministry of Environment, Forest and Climate Change
Government of India
2023



Government of India



Guidelines for Human–Bear Conflict Mitigation

Taking a Harmonious–Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Human–Bear Conflict Mitigation

Taking a Harmonious–Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	MoEF&CC	Ministry of Environment, Forest and Climate Change
CWLW	Chief Wildlife Warden	M&E	Monitoring and Evaluation
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-governmental organization
DFO	Divisional Forest Officer	NHAI	National Highways Authority of India
DLCC	District-Level Coordination Committee	NTCA	National Tiger Conservation Authority
DNA	Deoxyribonucleic acid	NTFP	Non-timber forest product
DPSIR	Drivers–pressures–state–impact–response	NTG	National Technical Group
ECG	Electrocardiogram	NWAP	National Wildlife Action Plan
EDC	Eco-development Committee	OPs	Operating procedures
EIA	Environment impact assessment	PA	Protected area
EWRR	Early Warning and Rapid Response	PMFBY	Pradhan Mantri Fasal Bima Yojana
FD	Forest Department	PPE	Personal protective equipment
GIS	Geographical information system	PRT	Primary Response Team
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	RFID	Radio frequency identification
GSM	Global System for Mobile Communications	RRT	Rapid Response Team
HBC	Human-Bear Conflict	SDRF	State Disaster Response Force
HWC	Human–wildlife conflict	SFD	State forest department
HWC-MAP	Human–Wildlife Conflict Management Action Plan	SHG	Self-help group
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SOPs	Standard operating procedures
HWC-SAP	State-level HWC Mitigation Strategy and Action Plan	VFC	Village Forest Committee
IUCN	International Union for Conservation of Nature	WII	Wildlife Institute of India
JFM	Joint Forest Management	WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	6
1.4 Legal and Policy Framework for Implementing the Guidelines	6
1.5 Institutional Mechanism for Implementating of These Guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of Human–Bear Conflict	8
3.1 Monitoring and Addressing Habitat Loss, Fragmentation and Degradation	8
3.2 Removal of Invasive Plant Species in and around Bear habitats	8
3.3 Reduce Livelihood Dependence of People on Forests	9
3.4 Measures to Strengthen the Role of Key Stakeholders and Cross-sector Cooperation	9
3.5 Community Awareness and Communication Measures to Facilitate Effective Engagement of Local Communities in HBC Mitigation	10
3.6 Effective Garbage Management and Safe Sanitation in and around Bear habitats	10
3.7 Systematic Research and Monitoring addressing HBC	10
3.8 Facilitating Capacity Development Measures to Develop the Required Competencies for Addressing HBC in the Most Effective and Efficient Manner	11
3.9 Measures to Strengthen the System of Knowledge Management in HBC Mitigation	11
4. Preventing Human–Bear Conflicts	12
4.1 Differential Mitigation Approach for Different HBC Scenarios	12
4.2 Identifying Hotspots of HBC	12
4.3 Effective Use of Early Warning and Rapid Response Systems at HBC Hotspots	12
4.4 Monitor and Document ‘Potential Bears-in-Conflict’ in the Landscape	13
4.5 Managing ‘Potential Bears-in-Conflict’	13
4.6 Judicious Use of Barriers, Taking a Landscape Approach	14
4.7 Judicious Use of Other Exclusionary Measures, Taking a Harmonious-Coexistence Approach	14
4.8 Support Local Population by Preventing Accidental Encounters with Bears	14
4.9 Support the Local Community with Crop Protection and Guarding Methods	15
4.10 Addressing Zoonotic and Other Emerging Diseases, Taking a One Health Approach	15
5. Addressing the Emergency Situations Arising due to HBC	16
5.1 Establishment of Emergency Response Mechanism	16
5.2 Intra- and Inter-Agency Coordination and Cooperation	16
5.3 Preparedness Of Response Teams	16
5.4 Action at the Onset of Emergency or Specific Situations	16
6. Reducing the Impact of HBC on the Health and Well-being of Humans	18
6.1 Addressing Loss of Human Life/Injury to Humans	18
6.2 Addressing Crop Damage and Livestock Loss/Injury	18
7. Reducing the Impact of HBC on the Health and Well-being of Bears	19
7.1 Management of Bears During Capture and Post-capture Operations	19
7.2 Release Essentials	19
7.3 Rehabilitation of the Captured Bear	20
7.4 Rescue and Raising of Orphaned/Strayed Bear Cubs-in-Conflict	20
7.5 Post-capture/Post-release Monitoring of Bears	20
8. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework Relating to HBC Mitigation in India	21
9. Process of Development, Pilot Testing of these Guidelines and Consultation Process	21
10. Monitoring and Evaluation of Guidelines	21
Annexe 1	22
National Technical Group (NTG)	22
Working Group on Pilot Implementation of Guidelines and HWC-NAP	22
Author Group for drafting the guidelines	22

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on human–bear conflict mitigation (HBC) get the overall context from the Wildlife (Protection) Act (WLPA), 1972, an advisory to deal with human–wildlife conflicts (MoEF&CC, 2021) and the National Human–Wildlife Conflict Mitigation Strategy and Action Plan of India (2021–26) (HWC-NAP)¹. HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good practices relevant to HBC issued by IUCN/SSC/BSG and advisories and operating procedures (OPs) issued by various state forest departments (SFDs) and builds on them to bring about a more holistic approach to HBC mitigation.
- In addition to the HBC mitigation guidelines, the following species-guidelines are being developed under the project: Guidelines for Mitigating Human–Elephant, –Leopard, –Gaur, –Snake, –Crocodile, –Rhesus Macaque, –Wild Pig, –Blue Bull and –Blackbuck Conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human–Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human–Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HBC in India, leading to co-existence, and to ensure standardization in performing mitigation operations in the most effective and efficient manner, with minimum harm to humans and bears.
- The guidelines not only provide advice on mitigation measures to be used to address HBC in the long term but also facilitate the development, assessment, customization and evaluation of site-specific HBC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HBC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HBC and are not limited to SFDs.
- The guidelines will be able to bring in more effectiveness and efficiency, when fully integrated into the division-level HWC Management Action Plans (HWC-MAPs) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAPs)².

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTING OF THESE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed for implementing these guidelines.

1 National HWC Mitigation Strategy and Action Plan of India (2021–26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2 Common Frameworks for Developing HWC-SAPs and HWC-MAPs (Supplementary Frameworks to HWC-NAP) (2021–26): <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impact of human–wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimizes conflict.

4 Supplementary Frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious- coexistence approach³ to ensure that both humans and bears are protected from negative impacts of HBC.
- The guidelines address the issue of HBC, taking a holistic approach. The holistic approach of the guidelines entails addressing not only the emergency situations arising due to immediate conflict situations but also the drivers and pressures that lead to HBC; providing guidance on establishing and managing prevention measures; and reducing the impacts of conflict on both humans and bears.
- The development of these guidelines and intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HBC mitigation measures among key sectors and stakeholders at the national, state and division/district levels.
- The guidelines reflect on the need for a landscape approach while formulating solutions for mitigating HBC to ensure that the solutions are sustainable. Unless comprehensive and integrated HBC mitigation measures are implemented across the landscape, the problem is likely to only shift from one site to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs during implementation.
- Taking a capacity development approach, the guidelines facilitate the implementers through provision of an *Implementer's Toolkit* to provide operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the WLPA 1972.
- The following legislations are considered directly relevant for conservation when dealing with HBC:
 - The Wild Life (Protection) Act, 1972
 - The Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6), 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HBC.
- *Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India*⁴ may be referred to for more details on specific legal provisions for HBC mitigation.
- Other important legislations that facilitate conservation when dealing with HBC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; and Disaster Management Act, 2005.

2. CONTEXT AND SITUATION

India is home to four species of bear, viz., the Himalayan Brown Bear, Asiatic Black Bear, Sloth Bear and Sun Bear. Although they are classified as carnivores, bears are largely omnivorous, feeding on a variety of fruits/nuts, ground-layer vegetation and insects and scavenging on dead animals. They are excellent seed dispersers and hence play a significant role in the regeneration and regulation of the populations of many plant species in forests. Hence, bears are considered as indicators of habitat quality. In India, bears have been associated with humans since time immemorial, as evident from mythology, folklore, culture, customs and traditions.

Of the four bear species in India, two are in conflicts with humans, viz., the Sloth Bear and Asiatic Black Bear. The Himalayan Brown Bear too is in conflict with humans but is largely confined to the upper regions of the Western Himalaya. There have been no reports of conflicts associated with Sun Bear.

HBC refers to the negative interaction between humans and bears, leading to adverse impacts on humans (such as injuries to humans, loss of human life and impacts on emotional well-being) and their resources (crops, livestock and other properties) and on the bears or their habitats.

The drivers of HBC include exponential growths of human populations in forest-fringe areas; habitat fragmentation and degradation; development activities such as linear infrastructure construction; a continued dependence of communities on forests for their livelihoods; a mismatch of conservation goals with human aspirations and changing life styles; and inadequate stakeholder engagement. Increasing human–bear interface areas, inadequate alternative livelihood options in forest-fringe areas and limited awareness among humans living in and around bear habitats about bear behaviour create further pressures, leading to injuries and loss of human lives and livestock injury/loss.

HBC primarily takes place when humans enter bear habitats for non-timber forest produce (NTFP) collection or for grazing their cattle or when bears enter human habitations in search of forage. Bear populations that occur outside protected areas (PAs), share space with humans, thereby increasing the probability of accidental encounters.

The Sloth Bear (*Melursus ursinus*) is a myrmecophagous species (specialized for feeding on termites and ants) that is very widely but patchily distributed in India. The Sloth Bear is found in forested as well as rocky and scrub habitats. The densities of Sloth Bear populations in India vary across the distribution range of the species. The conflict associated with the Sloth Bear is increasing rapidly.

The Asiatic Black Bear (*Ursus thibetanus*) is distributed in the forested habitats of the Himalayan region and the hills of the Northeast. The human–Asiatic Black Bear conflict is spread all across the distribution range in India, and it results in crop damage and livestock loss/injury.

The current response to HBC includes measures to prevent retaliatory killings of bears by humans, creating awareness amongst local communities to reduce accidental encounters and rescuing stranded bears or bears-in-conflict. As HBC leads to a changed perception of humans towards wildlife, the overall support for conservation declines. Therefore, it is important to address the issue in a holistic way, i.e., address the drivers and pressures, further develop prevention and emergency response measures and reduce the vulnerability of humans and bears to HBC in the interest of the overall need for conservation of wildlife/biodiversity in the country.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HUMAN–BEAR CONFLICT

HBC is a multi-faceted challenge, and thus finding solutions for prevention and mitigation requires an integrated and holistic approach. A major gap in HBC mitigation is effective identification of location-specific drivers and pressures of conflict that will allow appropriate selection of mitigation measures.

A systematic analysis of existing HBC mitigation methods may be carried out to assess their effectiveness and wildlife-friendliness and to assess their potential for replication in other locations and situations.

HWC-NAP recommends a holistic approach to HWC mitigation by considering and addressing the thematic triangle of drivers–prevention–damage mitigation. These guidelines are prepared in line with the recommended holistic approach to bridge the current gap.

3.1 MONITORING AND ADDRESSING HABITAT LOSS, FRAGMENTATION AND DEGRADATION

Monitoring the drivers and pressures will play a crucial role in understanding and mitigating HBC. The following habitat-related assessment and actions, which may need to be implemented by the SFDs in cooperation with other line departments and national-level and state-level agencies having the required expertise and technology, may help in planning these mitigation measures:

- Mapping the existing drivers and pressures of conflict and land use and land cover (LULC) changes and regularly monitor changes in the extent of the bear habitat, fragmentation and degradation due to developments (such as linear infrastructure), mining, encroachments, human settlements within forests and other anthropogenic pressures (collection of NTFP, stone quarrying, urban expansion, etc.).
- Identifying and mapping the areas covered by invasive species and carry out operations for improving the habitat, especially improving the production of NTFP.
- Ensuring that all forest boundaries are clearly demarcated so that patrolling teams can identify boundaries for detection of any encroachments.
- Collecting additional data on the bear habitat during the coordinated All India Tiger, Co-predator and Prey Population Estimation (AITE) exercises in the Tiger range areas and during the Snow Leopard Population Assessment in India (SPAII) exercises in the Himalayan region.

- Mapping land tenures and identifying communities who are stakeholders in these lands; conduct regular consultations with local communities to explore/develop Community Reserves and Other Effective Area-Based Conservation Measures (OECMs) to secure bear habitats.
- Engaging other relevant line departments whose officials can facilitate enhancing/improving livelihood options that reduce the extent and intensity of the anthropogenic pressure on natural bear habitats.
- Preparing, implementing and periodically updating long-term perspective plans, such as state-level HWC mitigation strategy and action plans (HWC-SAP), and division-level HWC management action plans (HWC-MAP). A common framework for developing these plans is provided in the *Supplementary Frameworks to the HWC-NAP*.
- Developing synergies and facilitating integrated land-use planning for effective implementation of planned measures through the state-level Coordination Committees (SLCC), the Multi-stakeholder Fora at the state level, the Joint Working Groups with key departments and agencies at the landscape level and the district-level Coordination Committees (DLCC).
- Engaging with local communities, especially the community PRTs, to develop innovative firefighting strategies, deploying the required equipment, using remote sensing technology, etc., to reduce the risk of habitat degradation due to forest fires.

3.2 REMOVAL OF INVASIVE PLANT SPECIES IN AND AROUND BEAR HABITATS

There may be suppression and reduction of indigenous food plants of bears due to the overabundance of invasive alien species in the area, resulting in decreased habitat quality and a consequent increase in the movements of bears out from forested landscapes into human-use landscapes, leading to increased HBC. The following measures are envisaged:

- SFDs may map the invasive species cover and abundance in the landscape and the bear use of the landscape and make further plans accordingly.
- Use of remote sensing data may be explored data for mapping invasive plants' hotspots and for managing the spread of invasive species.

- Prioritizing sites for intervention on the basis of hotspots of invasive species, areas critical for bears (and other herbivores) and conflict history to ensure efficient mitigation, given the scale of the problem and the challenges involved in containing and eliminating invasive species over large landscapes.
- Clearing vistas along the boundaries of forests close to human habitations for improving the visibility and avoiding sudden and accidental encounters with bears.

3.3 REDUCE LIVELIHOOD DEPENDENCE OF PEOPLE ON FORESTS

Accidental encounters of humans with bears inside forest areas can be prevented to a large extent by reducing dependence of humans on the forest. The following indicative measures may be implemented:

- Facilitating management interventions for better livelihood opportunities for communities living close to the forest, through community participatory approaches, including various eco-development measures and livelihood improvement programmes
- Reducing the dependence of forest-fringe communities on the forest for cattle grazing, fodder collection, fuelwood collection, non-timber forest produce (NTFP) collection, right of way, etc. through participatory forest management tools
- Addressing livelihood needs of communities through skill development, poverty alleviation and alternate income generation schemes of the Government
- Facilitating cross-sector linkages for community development (coordination and cooperation with line departments)
- Facilitating cooperation to integrate HBC mitigation planning at the district level, through measures including, but not limited to, dovetailing HBC mitigation measures with schemes relevant to community development.

3.4 MEASURES TO STRENGTHEN THE ROLE OF KEY STAKEHOLDERS AND CROSS-SECTOR COOPERATION

Cross-sectoral cooperation for HBC mitigation entails engagement of multiple stakeholders from different sectors and domains at the national, state and district/forest division levels. Key stakeholders for HBC mitigation may include the state forest department and other line departments, viz., the agriculture, revenue, animal husbandry, police, public works, health and family welfare and education departments and electricity boards; the private sector (fruit orchards and plantations); agencies, viz., railways, National Highway Authority of India; wildlife conservation and development NGOs; farmers' cooperatives and agricultural research institutions. The following measures are envisaged:

- State-level Coordination Committees (SLCC), landscape-level Multi-stakeholder Fora and District-level Coordination Committees (DLCC) may be used to strengthen the inter-agency coordination required for HBC, and district-specific operational mechanisms may be developed to address specific HBC mitigation needs.
- SFDs may facilitate the provision of support to the community-level (village/ward) Primary Response Teams (Community PRTs) as the entry point for all community engagement work. Establishment and capacity development of PRTs are to be in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*.
- Maintaining information and data on HBC cases with reference to the developments in the area that may have a bearing on conflict cases, may be used for discussions in the DLCC.

3.5 COMMUNITY AWARENESS AND COMMUNICATION MEASURES TO FACILITATE EFFECTIVE ENGAGEMENT OF LOCAL COMMUNITIES IN HBC MITIGATION

To facilitate effective engagement of local communities and various stakeholders in mitigation of HBC, it is extremely important to adopt a participatory approach in planning and implementing awareness and sensitization measures.

- Appropriate community awareness and communication measures may be implemented at HBC hotspots, and their impacts may be assessed periodically to ensure that the awareness and communication measures are locally customized.
- Participation from key stakeholders may be facilitated to ensure integration of traditional and local knowledge and experiences into development of division-level HWC Management Action Plans (HWC-MAPs) towards bear conservation and developing HBC mitigation measures.
- Successful cases may be documented by experts/organizations and can be used to motivate people to contribute to effective garbage management practices.

3.6 EFFECTIVE GARBAGE MANAGEMENT AND SAFE SANITATION IN AND AROUND BEAR HABITATS

Garbage is known to attract bears, and when garbage dumps are located on the periphery of forests or inside villages/towns, potential for accidental encounters between people and bears is created. Unmanaged garbage may also habituate bears to moving and foraging in human-use areas, and as a consequence there may be high levels of conflict.

The following measures are suggested:

- Ensuring sustainable and ecologically sound waste and garbage disposal by town municipalities and village panchayats on the borders of bear habitats, especially at HBC hotspots
- Undertaking periodic inspection by SFDs and other government departments/organizations of the forest perimeter near villages/towns to ensure that poor disposal of waste and garbage is detected early and brought to the notice of relevant local authorities. Volunteers can be engaged for such exercises.
- Community awareness, signage, etc. to facilitate effective participation of local communities in garbage management

- SFDs may also coordinate with municipalities/panchayats on garbage management and explore the possibility of building toilets under the Swachh Bharat Mission to prevent accidental encounters at HBC hotspots.
- ‘Aversion conditioning’ measures to be implemented in areas where bears have started foraging within the boundaries of villages and towns in search of garbage

3.7 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HBC

HBC mitigation is a challenging issue, especially when adequate data on the bear population density, ecology, demography and social and ranging behaviour and on the extent of damage caused by bears are not easily available. There is a clear need to have a more holistic understanding of HBC and its implications for both humans and bears.

SFDs may involve research institutions, non-governmental organizations (NGOs) and experts to carry out result-oriented research on the HBC status and mitigation measures, besides undertaking in-house research.

The following is an indicative list of research and action priorities that maybe taken up by research organizations:

- Study consequences of habitat fragmentation on density and population genetics of bears.
- Map the bear foraging, ranging and distribution patterns within human-dominated landscapes as the baseline for HBC mitigation planning
- Population dynamics and predictive modelling to manage conflict
- Monitor temporal overlap and segregation of human and bear activities
- Assess the socio-economic status of local communities living in and around bear habitats and their dependence on forest resources, as well as crop/livestock losses due to encounters with bears
- People’s perception surveys at HBC hotspots; gap analyses to develop awareness and communication measures
- Cost-effective crop protection measures in fruit orchards and crop fields
- Study to be conducted to understand the ethology of human–bear dynamics
- Explore the use of advanced technology to deter bear from entering human-dominated landscapes and to isolate anthropogenic food sources from bears

- Develop and use standardized criteria for assessing the effectiveness and wildlife-friendliness of mitigation measures

3.8 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HBC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

Capacity development of SFDs, other line departments, local communities and all key stakeholders may be facilitated to ensure that a holistic approach can be followed:

- SFDs may ensure that all response team personnel from forest and other line departments and agencies are brought under a systematic approach to capacity development, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*⁵
- Response teams and other field personnel and local community may be trained regularly and awareness measures carried out on prevention of zoonotic and other emerging diseases, and occupational health and safety, following the ‘One Health’ approach⁶
- Regular and systematic specialized training programmes on critical operations such as rescue, capture and translocation may be conducted jointly with other key relevant departments in the form of mock-drills and simulation training sessions.
- Advanced training programmes on animal welfare issues may be conducted for all personnel of the rapid response teams (RRTs)
- Competencies of members of RRTs may be reviewed on a regular basis, and their training curricula to be fine-tuned and updated regularly.

3.9 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT IN HBC MITIGATION

To ensure that HBC mitigation measures are effective and sustainable, it is essential that field experiences, learnings, field-evidence and conceptual advances be not only shared across key stakeholders and landscapes but that such knowledge be also documented, to be utilized for future strategies and plans related to HBC mitigation.

- The National as well as landscape-level multi-stakeholder Mitigation Fora and appropriate Working Groups may be used to share field experiences, learnings, success stories, evidence and conceptual advances, within/between the SFDs, across stakeholders and across bear landscapes
- Measures may be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances related to HBC mitigation, to inform the future strategies and plans on HBC mitigation

⁵ Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

⁶ The One Health concept is based on the understanding that human, animal, and environmental health are closely interconnected and interdependent. One Health is a collaborative, multi-sectoral and trans-disciplinary approach working at the local, regional, national and global levels with the goal of achieving optimal health outcomes, recognizing the interconnection between people, animals, plants and their shared environment.

4. PREVENTING HUMAN–BEAR CONFLICTS

Sloth Bears and Black Bears have a behavioural tendency to become habitual foragers of crops and Black bears are involved in livestock depredation. Most HBC cases are the result of accidental encounters in forests/farm lands. However, the chances of an intentional repeat encounter by a bear are very rare.

There are a few instances of bears habitually frequenting human habitation, foraging in croplands and becoming unusually irritable and aggressive (particularly when with cubs) towards humans.

Instances of accidental encounters with bears near their denning sites (used for resting and breeding) are common as bears may feel threatened and territorial instincts may be triggered.

4.1 DIFFERENTIAL MITIGATION APPROACH FOR DIFFERENT HBC SCENARIOS

HBC mitigation can be effectively addressed by a systematic analysis of the information on the type of conflict, the site of occurrence and its overall impact on humans and bears.

4.2 IDENTIFYING HOTSPOTS OF HBC

“HWC hotspots” are areas with actual or predicted repeated occurrence of HWC incidents that result in crop loss, livestock death, human death and injury and wildlife death and injury over temporal and spatial scales. Incidents can be static (repeated in the same place or time) or dynamic (shift in space and time over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

Identifying conflict hotspots, which could also provide a direction towards the drivers of conflict, is critical to providing site-specific solutions to mitigate HBC. Conflict hotspots of HBC can be mapped through geo-spatial assessments, using both primary and secondary data, including time-series data. The hotspots can be identified and mapped as follows:

- **Incident hotspot** – Frequency of occurrence of incidences over a specific period, such as 5 or 10 years, mapped over the target area. The data would include the number of incidences of crop loss, human injury/death and livestock injury/death.

- **Vulnerability hotspot** – Cumulative index calculated by overlaying past incidents, the vulnerability of the local community and the potential risk of the area.

The following assessments are envisaged:

- Database may be created by involving frontline SFD personnel, researchers, research institutions, veterinary professionals and others for identifying and assessing the hotspot
- Predictive modelling based on the field data and geographic information system (GIS) analysis may be carried out by trained personnel.

4.3 EFFECTIVE USE OF EARLY WARNING AND RAPID RESPONSE SYSTEMS AT HBC HOTSPOTS

An Early Warning and Rapid Response (EWRR)⁷ system may be established and used to enhance the preparedness and overall efficiency of mitigation efforts in the field.

The EWRR system may be in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity development of HWC Mitigation Response Teams*⁸.

- The system of early warning and rapid response can be used for detecting early conflict cases with bears and for ensuring appropriate responses in cases of HBC.

⁷ EWRR is a set of tools, processes and personnel competencies needed for timely and meaningful generation and dissemination of alert information to individuals, communities and establishments at risk, for optimal preparedness and responses at the appropriate time, to reduce the likelihood of injury, death or crop damage. EWRR structurally includes an HWC Mitigation Hub/Control Room and a system of three-tiered response teams, viz., Division-Level Rapid Response teams (Division RRTs), Range-Level Rapid Response Teams (Range RRTs) and village-/ward-level Primary Response Teams of the local community (Community PRTs).

⁸ Supplementary Frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

4.4 MONITOR AND DOCUMENT 'POTENTIAL BEARS-IN-CONFLICT' IN THE LANDSCAPE

A potential bear-in-conflict is an individual that is likely to enter a HBC situation owing to its movement pattern or other behaviour. Male bears, and bears with cubs, sometimes become habituated to easy food and frequently move into human-dominated landscapes in search of such food. SFDs may identify and manage such high-conflict individuals and monitor their movements within the favoured human-dominated areas.

Monitoring potential bears-in-conflict in the interface area can be carried out as a preparedness and prevention measure, to ensure that their movements within human-dominated landscapes do not lead to emergency situations. The following are methods for monitoring bears:

- Bear population monitoring may be done using sign surveys and camera traps. The data may be used to derive the relative abundances at the range and division levels so that the population status of the bears and its bearing on human–bear interactions are better understood.
- Another method of bear population estimation is scat/hair DNA analysis, which yields precise population estimates. Monitoring programmes for the Tiger, co-predators, prey and their habitats may be extended to cover additional bear-centric variables, including the abundance of fruit-bearing trees and termite mounds (for Sloth Bears). Monitoring natural and man-made water resources may be done annually.
- SFDs may build identification profiles of all the bears within their jurisdiction and beyond for identification of potential bears-in-conflict in the field, and their respective areas of movement, especially within agricultural landscapes.
- Bear Scat samples in and around crop fields and near livestock kills may be collected. DNA samples may be collected from livestock kill sites to create a database of photographed bears in the landscape and the corresponding DNA for future matching/differentiating in incidents.
- The information on the spatio-temporal use of the landscape by bears can be used to determine potential points of overlap that can result in accidental encounters for priority management interventions aimed at reducing HBC.

- Bears that have become frequent crop foragers, those that attack livestock, young transient bears residing in sub-optimal habitats on the periphery of forests and old, displaced bears may be actively monitored, either by physical means or using a network of camera traps or by satellite tracking using radio-collars, so that early warnings can be provided to local communities when known bears are entering their areas. Data can also help understand their ecology, their ranging patterns and possible HBC mitigation measures. The data can be used by RRTs to test if aversion conditioning could stop bears from entering human-use areas or preying on livestock.
- Bears that frequent human habitations, garbage dumps, livestock kill sites and farmlands may be identified and monitored, if possible, by deploying camera traps at strategic locations.
- Community PRTs may be facilitated in systematically monitoring green spaces and abandoned fields that may provide natural feeding habitats and movement areas for bears.

4.5 MANAGING 'POTENTIAL BEARS-IN-CONFLICT'

A novel useful approach would be to test different 'aversion techniques' to habituate bears-in-conflict to avoid human-dominated landscapes. Radio-collaring such individuals can be attempted so that systematic intervention is possible.

- Capture and translocation (if required) of individual bears that are highly aggressive may be carried out as per the existing rules and regulations and specific advisories from the state governments (if available). The rehabilitation of the bears in suitable habitats may be a viable option. Suitable areas for release may be determined.
- The movements of bears that are translocated to suitable habitats in deep forests may be monitored to determine their likelihood of returning to agriculture landscapes.
- Regular monitoring and reviewing of conflict situations by the state's Chief Wildlife Warden (CWLW) in all potential HBC hotspots may be ensured.

4.6 JUDICIOUS USE OF BARRIERS, TAKING A LANDSCAPE APPROACH

The preventive measures used by rural communities to deter bears from approaching their villages and crop fields or orchards are usually non-lethal methods that do not cause any harm to the bears. These methods are based on harmonious coexistence. The accessing by bears of non-natural food sources outside their habitats can be prevented by 'aversion conditioning' and causing fear-stimuli using the following methods:

- Facilitating local communities to develop their traditional barriers, including walls and fences, and keep monitoring the effectiveness and wildlife-friendliness of such barriers to optimize the design, material, etc. of these barriers.
- When SFDs are initiating the development of barriers, a participatory approach is to be adopted at all stages, i.e. planning, designing, monitoring and maintenance. Systematic engagement with communities is essential for the sustainability of such structures.
- Community-based institutions may be facilitated by SFDs through wildlife experts/organizations in motivating, training and hand-holding communities in the use of barriers to ensure that their measures are effective and wildlife-friendly.

4.7 JUDICIOUS USE OF OTHER EXCLUSIONARY MEASURES, TAKING A HARMONIOUS-COEXISTENCE APPROACH

The following measures are envisaged:

- The use of visual deterrents such as flashlights, torches, flashbulbs and other bright lights in villages and while travelling at night and flashing high-powered beams and torches will deter bears.
- The use of auditory deterrents, loud noise-creating devices, such as ANIDERS (Animal Intrusion Detection and Repellent Systems), and hooters temporarily deters bears at bay till a PRT/RRT arrives to drive the bear away.
- The use of olfactory deterrents is very effective with bears, which have an acute sense of smell. Such deterrents include pepper sprays and chili bombs. Cultivating unpalatable aromatic crops (capsicum, chillies, etc.) in kitchen gardens is also effective.

- The use of guard-dogs is helpful in raising an alarm upon sensing the presence of bears near human habitations.
- The use of hazing techniques—collective action by a large number of persons to drive bears back to the forest. This is only a temporary deterrent as the bears may return soon.
- Since fruit-bearing species such as *mahua*, *ber* and guave, and crops such as corn, millets etc. attract bears, local communities residing in HBC hotspots are to be encouraged to cultivate alternative crops or find effective and suitable wildlife-proof storage options.
- Community-based institutions may be facilitated by SFDs through wildlife experts/organizations in motivating, training and hand-holding communities in the use of exclusionary measures to ensure that these measures are effective and wildlife-friendly.

4.8 SUPPORT LOCAL POPULATION BY PREVENTING ACCIDENTAL ENCOUNTERS WITH BEARS

SFDs may facilitate and encourage local NGOs, volunteers and other stakeholders to implement safety measures, aiming at preventing human–bear encounters.

- These measures may include guiding humans in watching for signs of bear presence and in responding when they encounter a bear.
- Briefing of vulnerable groups can be done, including workers of crop fields/tea or other plantations, before every work season about the bear risk and safety issues.
- Regular training programmes may be organized in local schools and colleges and possibly during village meetings at HBC hotspots to train humans in safety measures.
- Safety audits⁹ may be conducted each year, if feasible, to ensure that all members of the community act responsibly in case of HBC and to facilitate inter-agency cooperation.

⁹ Security audit audit is a process for evaluating the effectiveness and wildlife-friendliness of the safety measures in place from both the human and wildlife safety viewpoints. Its primary purpose is that people act responsibly and comply with norms and guidelines.

4.9 SUPPORT THE LOCAL COMMUNITY WITH CROP PROTECTION AND GUARDING METHODS

Guarding crops from any wildlife-safe structures is one of the most effective early warning and deterrent techniques. Crop-guarding involves deterring bears by driving them by making a noise (i.e., shouting, beating drums or tins) and using dogs to frighten them. The following measures are envisaged:

- Community PRTs and farmer groups may be engaged to ensure that besides preventive measures, traditional crop-guarding methods are also encouraged, with the active involvement of the local community/farmers.
- Awareness building and training may be carried out on the effective and wildlife-friendly usage of visual, auditory and olfactory deterrents so that no harm befalls the bears.
- Farmers may be supported to adopt communal/cooperative crop-guarding measures through various incentive mechanisms and subsidized funding under district schemes (such as MGNREGS).
- A compendium on good practices on crop-guarding techniques may be developed for the use of communities.

4.10 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH¹⁰

Response teams and other stakeholders at HBC hotspots are vulnerable to a variety of zoonotic diseases that can be transmitted from domestic animals and wildlife to humans and from humans to domestic animals.

- Veterinary capacities and infrastructure may be upgraded to facilitate disease-monitoring in wildlife populations, to conserve wildlife and to prevent zoonotic diseases from spreading to livestock and human populations.
- A well formulated Wildlife Health Management and Disease Surveillance Plan may be developed at every forest division/PA.
- All personnel involved with capture operations may be trained, vaccinated and equipped.
- The basic approach is to integrate the concept of One Health¹¹, which links human and animal health in a shared environment into all such operations and HBC mitigation measures in the field.

¹⁰ The One Health approach is a collaborative, multi-sectoral and trans-disciplinary approach to prioritize zoonotic diseases of greatest concern that should be jointly addressed by the human, animal and environmental health sectors, working at the local, regional, national and global levels with the goal of achieving optimal health outcomes.

¹¹ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HBC

Emergency situations¹² are to be promptly handled to ensure reduced vulnerabilities to both humans and bears.

An indicative list of the potential emergency situations, listed in decreasing order of priority, is provided here:

- Bear activity has caused injury to or the death of a person.
- Bear activity has caused damage to property.
- A bear has interacted aggressively with livestock.
- A bear has entered a building inhabited by humans.
- A bear has been injured or died due to retaliatory actions by humans, or a bear has fallen into a well or deep ditch.
- Crops have been damaged by bear-foraging.
- There have been bear-sightings in the vicinity of agricultural lands/settlements/livestock night-shelters, which have created panic among humans.

Key response procedures are to be established and actions promptly implemented/undertaken for addressing emergency situations.

The key emergency response procedures include the following:

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

A strong institutional mechanism is required, to respond to any emergency situation arising due to HBC. This starts with the detection of the incident and proceeds to communication to the Control Room. Then information may be disseminated to the officials and staff members in the command-and-control hierarchy, including the forest department and civil administration, for initiation of appropriate response actions. The divisional forest office coordinates the action by deploying RRTs to the incident site. The field support operations are to be structured around the following key operational stages for synchronization of activities and meeting the emergency:

- Monitoring and situational awareness
- Mitigation Hub/Control Room/helplines to receive and disseminate information
- RRT/PRT personnel, veterinary team, drugs and equipment, mobility and communication facilities to address emergency situations effectively and efficiently.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

Operating procedures may be laid down in each forest division/district in line with these guidelines and in line with the institutional framework suggested under the HWC-NAP to ensure timely coordination amongst the various response teams from the Forest Department and other agencies, under the DLCC, consisting of the District Magistrate/District Collector, the police, the fire services, the Animal Husbandry Department, the Health Department, SDRF, Agriculture Department, Department of Rural Development and Panchayati Raj, paramilitary forces, and other key relevant departments and agencies, and the local community, especially panchayat leaders and community PRTs.

5.3 PREPAREDNESS OF RESPONSE TEAMS

- A structured mechanism may be established to deploy competent personnel in the RRTs, and to ensure periodic competencies-development measures for them, including training, role clarity and equipment. The Area of Operation of each RRTs may be fixed in such a way that facilitates timely response from the RRTs. *Supplementary Framework on Establishment and Capacity Development of HWC Mitigation Response Teams* may be referred to for composition of the RRTs and role clarity.
- Operating Procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (Community PRTs, RRTs) are established through training sessions and other measures, including training in relation to occupational health and safety.
- Operating Procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of the need to prevent, manage and control zoonotic diseases and pandemics effectively.

¹² Emergency or crisis situations can be defined as situations that are sudden, unexpected, have the potential to be serious/are serious in nature and therefore require immediate intervention in time and space, from concerned stakeholders, to minimize loss of lives and assets.

5.4 ACTION AT THE ONSET OF EMERGENCY OR SPECIFIC SITUATIONS

5.4.1 Identification of bears-in-conflict

- Bears-in-conflict can be identified by their movements within human-use area, signs (bear tracks, scats, claw marks etc.), encounters with humans/livestock, etc. The decision to declare that a bear is a grave threat will depend on the behaviour of that bear, the degree of risk to public safety and the proximity of the bear's activities to facilities or human-use areas. Before any decisions are taken, it may be ascertained that appropriate management actions have already been exhausted. If the bear poses an imminent risk to human safety and continues to visit human-use areas despite repeated hazing, it may be captured, relocated or shifted to a captive facility.
- The severity of the HBC will warrant appropriate action. However, if there is no imminent risk to human safety or property, the bear is to be left alone, to return to the forest. Bears showing "defensive" aggression are not necessarily to be treated with severe management responses such as translocation or capture. However, bears that have become habituated or food-conditioned or show "offensive" aggression toward humans are to be translocated first.
- The following steps can be taken by the field teams for identifying individual bears-in-conflict.
 - The conflict location is to be cordoned off. The area within 100 m of the incident is to be investigated, focusing on trails, kills, carcasses, waste dumps, etc. Bear footprints or tracks and other physical signs (digging signs, feeding signs) of bear presence are to be recorded and monitored.

- Camera traps and bear hair-snare stations may be deployed. The camera trap database (if available) is to be investigated and the individual identified by matching. Bears may be shortlisted on the basis of the existing database and the newly deployed camera traps.
- A post-mortem examination is to be conducted of the dead human/livestock of the HBC incident.
- DNA samples such as bear scats, saliva from kills/carcasses and hairs (wherever possible) are to be collected.
- Details of the incident are to be investigated for corroboration with the circumstantial evidence, statements of the injured person, etc.
- All potential conflict bears may be investigated by corroborating the post-mortem analysis, circumstantial evidence, frequency of capture, age and injuries on the body of the bear. Repeated incidents of any nature will help narrow down the specific bear further.

5.4.2 Other key response actions during and after an emergency

- Operating procedures may be laid down, in line with the other guidelines issued by MoEF&CC, for stepwise key actions, for all emergency situations, media engagement, crowd management, addressing health emergencies and post-response operation for the management of the animal. This includes ensuring the animal's health and safety during capture, transport, selection of a translocation site and monitoring the animal after releasing it safely back into the wild.

6. REDUCING THE IMPACT OF HBC ON THE HEALTH AND WELL-BEING OF HUMANS

The three most frequent manifestations of HBC are human injury/casualties, livestock loss and bear trapping/retaliatory killings. The following curative measures provide a framework for responses in the event of these manifestations.

6.1 ADDRESSING LOSS OF HUMAN LIFE/ INJURY TO HUMANS

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family should be made into their bank accounts.
- In the HBC hotspots, a revolving fund may also be established, at the division-level, to ensure that funds are available for providing immediate relief to the victim's family/heirs.
- In the case of an injury as a result of an encounter with a bear, the victim needs to be immediately hospitalised and *ex gratia* payment made as per the norms of the state government.
- Professional counselling through qualified psychiatrists/health workers will be useful in helping victims recover from the effects of such traumatic incidents. The SFDs and other government agencies/institutions may organise some counselling sessions for such victims and support them as they recover from the psychological impact.
- In general, efforts are to be made for simplification of procedure for release of *ex gratia* to facilitate faster payments, to ensure timely support to the affected humans.

6.2 ADDRESSING CROP DAMAGE AND LIVESTOCK LOSS/INJURY

- The Ministry of Agriculture and Farmers Welfare has included crop loss caused by activities of wild animals under its flagship scheme *Pradhan Mantri Fasal Bima Yojana* (PMFBY), which can be used as an important HBC mitigation instrument.
- The process of providing *ex gratia* for crop or property loss should be transparent and simplified. Mobile apps may be used for collecting information and processing of claims from farmers, after crop losses from bear activities, to ensure that there is efficiency and transparency in the system. Experiences and success-story sharing across states can facilitate further improvements in the system.
- Farmers may be encouraged, facilitated through community-based institutions, to explore solutions such as changing cropping patterns and using non-preferred crops by bears. Site-specific studies may be conducted to find out appropriate crops that are non-palatable to bears, in collaboration with agricultural institutions.
- Collaborative efforts can be made to promote market-based arrangements for alternate crops, wherever feasible. Community Primary Response Teams (PRTs) may be engaged to facilitate this process in their respective villages/areas of operations.
- Stall-feeding of livestock in HWC hotspots may be encouraged to reduce conflict and the risk of loss of livestock due to grazing inside forests.
- A dialogue may be initiated with the insurance sector for providing insurance cover for damage due to HBC. The modalities of the programme may vary from place to place according to the assessment of the risk by the insurance companies. The feasibility of such modalities may be explored at the state level.

7. REDUCING THE IMPACT OF HBC ON THE HEALTH AND WELL-BEING OF BEARS

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Articles 48A and 51A(g)) and as per the statutory provisions made under the Indian Penal Code (Sections 428 and 429), Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), Motor Vehicles Act 1978 (Transport of Animal) Rules, 2001 and guidelines issued by the MoEF&CC and Central Zoo Authority.
- The bear may be regularly monitored for signs of discomfort or stress during the entire journey by a veterinary professional.

7.1 MANAGEMENT OF BEARS DURING CAPTURE AND POST-CAPTURE OPERATIONS

At present, most captures of bears are carried out by trapping into cages, followed by immobilization.

- Once a bear is captured/properly immobilized, the first step is to restrain it securely in a comfortable position to maintain clear airways.
- The veterinary officer present may examine the health status of the bear and monitor its vital signs (temperature, respiration rate, blood oxygen level, pulse, colour of the mucous membrane, etc.).
- Any significant deviation from the normal physiological parameters should be dealt with immediately and appropriately.
- The captured bear may be examined carefully for any external injuries, the health condition, broken teeth or claws, ecto-parasites, etc. Appropriate treatment of any wounds may be carried out before initiating transportation.
- In case a bear has a broken limb, it may be sedated and housed in an appropriately designed cage before transportation.
- Bears may be transported in specially designed vehicles for long-distance transportation, with adequate ventilation options and free from exhaust fumes and bright sunlight. There may be a lighting facility during night, and the floor may be sound and non-slippery. Drainage should be provided to facilitate disposal of waste, etc.
- The bear may be transported in a compartment within a truck/trailer. The compartments may meet the minimum requirements of container construction, in terms of strength, stability, safety and size.
- Stops *en route* may be pre-planned and identified well in advance. The journey may be as short as possible, and the safety and well-being of the bear may be ensured.

- The bear may be regularly monitored for signs of discomfort or stress during the entire journey by a veterinary professional.
- The bear may be transported from the capture site to the release site or the rescue/rehabilitation centre following the guidelines for transportation of wild animals.
- Personnel handling and transporting the bears may be trained to avoid any accidents and consequent trauma to the bears that are being transported.
- Provisioning of feed and water during transport is to be ensured, and special care is required in the case of long-distance travel from the capture site to the release site/rescue facility.
- Water should be available at hand at all times to control possible hyperthermia of the bear during transport.

7.2 RELEASE ESSENTIALS

Translocation is a management technique to shift a bear-in-conflict from its active area to a suitable habitat a short or long distance away, depending on its conflict history, age, gender and habituation towards humans.

- The location for the release of the captured bear may be determined depending on the suitability of the habitat, existing abundance and density of bears and availability of water and bear food plants.
- The release site may be close to the capture site (nearest to the home range of the captured bear). Only in exceptional circumstances may the bear be released at far-off sites (>20 km). Bears may be released directly into suitable release sites (hard release).
- Bears may be monitored for any transport injuries or any other health-related issues prior to release.
- In case a bear is destined for captivity, it may be held in a fenced enclosure/kraal. This would provide chances for it to recover from the stress of transport and to get acclimatized to its surroundings at the new destination. It will also provide opportunities for monitoring it intensively and for veterinary management.
- Release sites may have proper off-loading facilities and the release is to be completed with the least possible stress to the bear.
- After a bear is released into its native habitat, its behaviour and its interactions with other bears may be monitored.

- Bears may be monitored after release for injuries, wounds, ill-health and diseases, such as nervous, locomotive or digestive disturbances, by a team of veterinary professionals, biologists and a manager during the initial period after the release.
- The health of released bears may be subjected to long-term monitoring.
- In case the bear is required to be kept in captivity, the space provided to the bear should be as per the guidelines issued by the Central Zoo Authority (CZA).
- Proper sanitation and hygiene should be maintained to avoid chances of infection or diseases.
- Adequate balanced food and water may be made available, along with mineral and vitamin supplements, according to the health status of the bear.

7.3 REHABILITATION OF THE CAPTURED BEAR

- In case where bears are brought into captivity temporarily, for the purpose of treatment of a medical condition, they may be released after treatment taking into consideration their past record in conflicts, if any.
- Bears that have a history of conflict usually carry injuries. They may not be released back into the wild as they are not only vulnerable but also highly habituated to humans and hence may need to be kept in a lifetime care facility.

7.4 RESCUE AND RAISING OF ORPHANED/ STRAYED BEAR CUBS-IN-CONFLICT

- The mother bear is very protective of her cubs. Due to certain circumstances (having been chased by humans, adverse climatic conditions, death of the mother, etc.), the cubs may sometimes be abandoned or orphaned and may require to be taken into captivity. Hand rearing of bear cubs is a highly specialized skill that requires a lot of patience and round-the-clock monitoring. It must strictly follow standard husbandry practices, as listed here:
 - A rescued cub may be raised under the guidance of a veterinary officer, while the husbandry care may be entrusted to an experienced animal keeper. The cub may be handled only by one keeper, with the full precautions of hand hygiene and sanitation of the room/enclosure in which the cub is housed followed.
 - For young cubs under the age of one year, the constant presence (24x7) of the keeper is critical, as the stress of separation can very adversely affect their survival.
 - A cub should not be exposed to other humans as it has a weak immunity at its ages and may contract diseases easily.

7.5 POST-CAPTURE/POST-RELEASE MONITORING OF BEARS

- Bio-logging is an important tool for monitoring wild animals, including bears. The following technology may be utilized effectively to monitor bears after relocation or translocation:
 - Radio-tracking through satellites or GPS, if available, may be done. Deploying collars with the 'remote drop-off option' facilitates retrieval of a collar without having to recapture the bear.
 - Radio frequency identity (RFID) microchips (PIT tags) may be used for tagging all captured (not radio-collared) wild bears before release or when they are brought to captivity.
- Ear tags may be used for easy future identification in the field.
- Deployment of a network of camera traps spread across the release location may provide useful information on the tagged bears after they are released.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK RELATED TO HBC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback received from implementing them.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for fine-tuning

these mitigation measures and for understanding the capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further reviewing the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed that consisted of representatives from government agencies, SFDs, research institutions, civil society institutions and international organizations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.

- A common understanding was developed on the overall purpose, scope, approach and methodology¹³. The experts had different roles in the drafting and editing process, viz., Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII), *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and independent

wildlife and policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEFCC in December 2022, consisting of officials from MoEFCC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years from 2023 onwards. However, a mid-term review

process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- The mechanism, templates and guidance for collating information and feedback on the use of these guidelines may be developed.

13 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Ministry of Environment, Forest and Climate Change
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2023



Government of India



Guidelines for Mitigating Human-Blue Bull Conflict

Taking a Harmonious-Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Mitigating Human-Blue Bull Conflict

Taking a Harmonious-Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	JFM	Joint Forest Management
CWLW	Chief Wildlife Warden	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-governmental organization
DFO	Divisional Forest Officer	NTCA	National Tiger Conservation Authority
DLCC	District-level Coordination Committee	NTG	National Technical Group
DNA	Deoxyribonucleic acid	NWAP	National Wildlife Action Plan
EIA	Environmental impact assessment	OPs	Operating procedures
EWRR	Early Warning and Rapid Response	PA	Protected area
GIS	Geographical information system	PCCF	Principal Chief Conservator of Forest
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PPE	Personal protective equipment
Goi	Government of India	PRT	Primary Response Team
HBLC	Human-Blue Bull Conflict	RFID	Radio frequency identification
HOFF	Head of Forest Force (in a state)	RRT	Rapid Response Team
HWC	Human-wildlife conflict	SDRF	State Disaster Response Force
HWC-MAP	Human-Wildlife Conflict Management Action Plan	SFD	State forest department
HWC-NAP	National Human-Wildlife Conflict Mitigation Strategy and Action Plan	SHG	Self-help group
HWC-SAP	State-level HWC Mitigation Strategy and Action Plan	SLCC	State-level Coordination Committee
IFS	Indian Forest Service	SOPs	Standard operating procedures
IUCN	International Union for Conservation of Nature	WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	6
1.1 The overall context	6
1.2 Purpose and scope	6
1.3 Approach	6
1.4 Legal and policy framework for implementing the guidelines	6
1.5 Institutional framework for implementing the guidelines	6
2. Context and Situation	7
3. Addressing the Drivers and Pressures of HBLC	8
3.1 Zonation	8
3.2 Monitoring and managing habitat-related drivers and pressures	8
3.3 Measures to strengthen cross-sector cooperation to be institutionalised	9
3.4 Measures to strengthen the system of knowledge management in HBLC mitigation	9
3.5 Systematic research and monitoring addressing HBLC	9
4. Deploying Measures to Prevent HBLC	10
4.1 Mapping HBLC hotspots and monitoring the populations at hotspots	10
4.2 Support local communities in crop protection measures	10
4.3 Scientific Management of Population at HBLC hotspots	11
4.4 Addressing zoonotic and other emerging diseases, taking a one health approach	11
5. Addressing the Emergency Situations Arising due to HBLC	12
5.1 Establishment of emergency response mechanism	12
5.2 Intra- and inter-agency coordination and cooperation	12
5.3 Preparedness of response teams	12
5.4 Action at the onset of an emergency or specific situation	12
5.5 Key response actions during and after an emergency	12
6. Reducing the Impact of HWC on the Health and Overall Well-being of Affected Humans	13
6.1 Addressing a situation of loss of human life	13
6.2 Addressing a situation of crop and property damage	13
7. Reducing the Impact of HBLC on the Health and Well-being of Blue Bulls	14
7.1 Overall context	14
7.2 Addressing the health and well-being of Blue Bulls during capture and translocation and after capture	14
8. Use of Learnings From the Guidelines to Further Strengthen Institutional and Policy Framework on HBLC Mitigation in India	15
9. Process of Development, Pilot-Testing of these Guidelines and the Consultation Process	15
10. Monitoring and Evaluation of Guidelines	15
Annexe 1	16
National Technical Group (NTG)	16
Working Group on Pilot Implementation of Guidelines and HWC-NAP	16
Author Group for drafting the guidelines	16

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on Human–Blue Bull Conflict (HBLC) mitigation get their overall context from the Wild Life (Protection) Act, 1972, National Wildlife Action Plan (2017-35)¹, the Advisory to Deal with Human–Wildlife Conflicts (MoEFCC 2021) and the National Human–Wildlife Conflict Mitigation Strategy and Action Plan of India (2021–26) (HWC-NAP)². HWC-NAP provides the overall conceptual and institutional framework for implementing these guidelines.
- These guidelines take into consideration the existing guidelines and advisories issued by various state government and build on them to bring about a more holistic approach to HBLC mitigation.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.
- In addition to the HBLC mitigation guidelines, following guidelines are to provide guidance on other selected species: guidelines for mitigating human–Elephant, –Leopard, –Gaur, –Snake, –Crocodile, –Macaque, –Wild Pig, –Bear and –Blackbuck conflicts.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HBLC in India, and to ensure standardization in performing mitigation operations in the most effective and efficient manner, with minimum damage to people and Blue Bulls.
- The guidelines provide advice on mitigation measures to address HBLC in the long term, as well as facilitate the development, assessment, customization and evaluation of site-specific HBLC mitigation measures that are effective and wildlife-friendly.
- The holistic approach of the guidelines entails addressing not only the emergency situations arising due to immediate conflict situations but also the drivers and pressures that lead to HBLC; providing guidance on establishing and managing prevention methods; and reducing the impacts of conflicts on both humans and Blue Bulls.
- The guidelines serve as a basis for long-term planning and coordination of HBLC mitigation measures at the state and division levels and provide good practices in using humane mitigation operations to ensure the welfare of Blue Bulls along with humans.
- In general, the guidelines apply to all stakeholders relevant to HBLC mitigation and are not limited to state forest departments (SFDs).
- The guidelines will be able to bring in more effectiveness and efficiency when fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.5 INSTITUTIONAL FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed for implementing these guidelines.

1 MoEFCC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 Harmonious coexistence is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impact of human-wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans where both are given equal importance. Overlap in space and resource use is managed in a manner that minimizes conflict.

4 Supplementary frameworks to the HWC-NAP <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence approach³ to ensure that both humans and Blue Bulls are protected from negative impacts of HBLC.
- The guidelines address the issue of HBLC, taking a holistic approach. The holistic approach of the guidelines entails addressing not only the emergency situations arising due to immediate conflict situations but also the drivers and pressures that lead to HBLC; providing guidance on establishing and managing prevention methods; and reducing the impacts of conflicts on both humans and Blue Bulls.
- The development of these guidelines and intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HBLC mitigation measures with key sectors and stakeholders at the national, state and local levels.
- The guidelines highlight on the need for a landscape approach while formulating solutions for mitigating HBLC to ensure sustainable solutions as unless comprehensive and integrated HBLC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate the implementers through an *Implementer's Toolkit* that contains operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines are to be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wildlife (Protection) Act, 1972. The following legislations are considered directly relevant for conservation when dealing with HBLC:
 - Wildlife (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Other important laws that facilitate conservation when dealing with HBLC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; and Disaster Management Act, 2005.
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLP Act 1972 are especially relevant when dealing with HBLC.
- *The Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India*⁴ is to be referred to for more details on the specific legal provisions for HWC mitigation.

2. CONTEXT AND SITUATION

- The Blue Bull (*Boselaphus tragocamelus*), popularly known as the Nilgai, is the largest amongst Asian antelope species, and is endemic to the Indian sub-continent. Blue Bulls are found in land with scattered trees, short dry savannah grasslands, thorny woodlands, plains and low hills covered with scrub. The combination of their grazing and browsing activities makes Blue Bulls an important part of the ecosystem and a good indicator of habitat quality.
- Habitat loss, fragmentation and degradation, together with expanding crop fields due to an increasing human population and inadequate crop guarding methods, have led to situations causing HBLC. In many states, the natural habitat of the species has either shrunk drastically or has been degraded severely, resulting in Blue Bulls foraging well inside human-dominated landscapes and far from forest edges. Further, a reduced tolerance of people towards crop losses has accentuated the conflict situation—both factually and in terms of perception.
- The species co-occurs with another antelope, the Blackbuck, in some parts of the country. The Blackbuck is a Schedule I species under WPA-1972, and therefore, differential mitigation strategies need to be designed for the Blue Bull and the Blackbuck, as per the level of protection given to these species under the act.
- Human-Blue Bull Conflict (HBLC) refers to the negative interaction between humans and Blue Bulls, leading to adverse impacts such as injury of humans, loss of crops and other property or even impacts on emotional well-being, and equally negative impacts on Blue Bulls or their habitats.
- All-India population estimates are required for the species.
- To ensure effective HBLC mitigation, there is a need for further information and knowledge management on effective crop guarding methods against Blue Bulls, and standardization of capture and translocation methods for the Blue Bull in India. Chemical capture methods are available, particularly for single animals or small herds. However, the drug of choice and the capture, handling and transportation of Blue Bulls need to be standardized.
- HBLC mitigation is also being addressed by the agricultural sector in India, under the All India Network Project on Vertebrate Pest Management of the Indian Council of Agricultural Research (ICAR) under the Ministry of Agriculture and Farmers Welfare, Government of India.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HBLC

The National HWC Mitigation Strategy and Action Plan envisage a holistic approach to HWC mitigation by considering and addressing the thematic triangle of drivers–prevention–damage mitigation. These guidelines have been prepared in line with the recommended holistic approach to bridge the current gaps. A combination of different approaches (including habitat integration, effective crop protection measures and crop insurance) has been suggested to address the drivers and pressures of HBLC.

3.1 ZONATION

- Zonation takes into consideration the resources available and allows a science-based pragmatic approach to landscape-level planning for conservation and HBLC mitigation.
- **Zone 1 - Blue Bull habitat zone:** This zone is in forested areas. Hence, specific management interventions for HBLC mitigation are not required.
- **Zone 2 - Human–forest interface:** There is an active need to manage the Blue Bull population in this zone. Agricultural institutions and panchayats may be engaged as active stakeholders. Preventive measures such as barriers may prove to be effective in this zone. Long-term population management can also be planned for this zone.
- **Zone 3 – Blue Bull exclusion or removal zone:** In this zone, Blue Bulls inhabit refuges, agricultural fields away from the forest, wastelands and village forests or agricultural fields and have adapted well to humans. These populations are not very dependent on the adjoining forests and depend on agriculture primarily.

3.2 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

- Focused efforts should be made to prevent or minimize the degradation and loss of remaining natural/near-natural habitats of Blue Bulls existing outside protected areas. Habitats may be restored to support the existing populations and to sustain restricted populations in remnant near-natural habitats.

- As high-energy crop species attract Blue Bulls, there is a need to sensitize farmers and change the type of crops and develop market-linked instruments.
- An assessment of the long-term outcomes and implications of all mitigation methods is needed to identify effective and wildlife-friendly mitigation measures to address HBLC. A systematic analysis of HBLC mitigation methods may be done to assess their effectiveness and wildlife-friendliness in different types of conflict situations. This will facilitate the customization and adoption of mitigation measures to achieve the best possible impacts in field. Cross-sectoral cooperation, especially between the forest and agriculture sectors, is critical for addressing the drivers of HBLC.
- Due to the dominance of invasive species that out-compete native vegetation for space, there may be a reduction in the prevalence of native woody shrubs and a suppression of native tree species, which may result in increased HBLC. Therefore, efforts may be made towards removal of invasive species from critical Blue Bull habitats.
- A local overabundance⁵ of wildlife (including Blue Bulls) could be due to various factors, including habitat loss, degradation and fragmentation of natural habitats and increases in populations. Several Blue Bull populations in the fringes of forests have become habituated to humans. Therefore, there needs to be a clear understanding of the spatio-temporal distribution of a population, its foraging and ranging patterns and its use of human-dominated landscapes. The population dynamics of Blue Bulls in crop fields where there are resident populations may be understood, and changes in their behavioural attributes may be recorded.

⁵ 'Local overabundance' refers to the occurrence, in a habitat, excessive number of individuals of a species beyond the normal population density, due to a variety of factors.

3.3 MEASURES TO STRENGTHEN CROSS-SECTOR COOPERATION TO BE INSTITUTIONALIZED

Cross-sectoral cooperation for HBLC mitigation entails engagement of multiple stakeholders from different sectors and domains at the state level, at the landscape level and at the forest division/district level. Key stakeholders for HBLC mitigation will include the SFD, the agriculture department and other institutions under the agriculture sector, the district administration, the animal husbandry department, the health department, the family welfare department, the education department, local schools and colleges, local hospitals, wildlife conservation and development NGOs, farmers' cooperatives and agricultural research and extension institutions.

- State-level coordination committees (SLCC), a landscape-level multi-stakeholder forum and district-level coordination committees (DLCC) may be used to strengthen the inter-agency coordination required for HBLC. A district-specific operational mechanism may be developed to address specific needs of HBLC mitigation.
- Safety audits focusing on crop protection measures may be conducted each year, if feasible, to ensure that all act responsibly and to facilitate inter-agency cooperation.
- Coordination between the forest and agriculture sectors is important, and dedicated programmes at the national, state and district levels may be formulated to effectively implement these guidelines.
- Workshops and dialogues with and training of the local community, especially members of the PRI institutions, may be organized at all HBLC hotspots to ensure a common understanding of the gravity of situations when the option of hunting is to be exercised.

3.4 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT IN HBLC MITIGATION

To ensure that HBLC mitigation measures are effective, wildlife-friendly and sustainable, it is essential that field experiences, learnings, field-evidence and conceptual advances, especially related to crop protection measures, be not only shared across key stakeholders and landscapes but also documented to be utilized for future strategies and plans related to HBLC mitigation.

- Landscape-level multi-stakeholder fora and appropriate working groups may be used to share field experiences, learnings, evidence and conceptual advances within the forest department, across stakeholders and across landscapes.
- Measures may be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances related to HBLC mitigation to inform future strategies and plans.

3.5 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HBLC

Specific information on the distribution, abundance and interactions of Blue Bulls with humans is not available for most places. Most studies report encounter rates of Blue Bull signs, and there is little effort to calculate the population index or local population details. Appropriate monitoring methods are not used. Current population densities, the demographic structure of various populations and general behaviour may be thoroughly quantified before any population management intervention is done.

- Camera trap studies conducted in interface areas and agricultural fields can provide a more detailed and better estimate of the population and behavioural ecology of the Blue Bulls and facilitate further strengthening of crop protection measures.
- Studies may be conducted on the intensity of conflict, crops affected, crop types, distance from forest/refuge, age/sex of individuals foraging on the crops, etc. to assign conflict intensity levels to various sites and establish priority sites for conflict mitigation.
- The crop foraging behaviour of herds and individuals (both species-specific and landscape-specific) may be studied (availability of food in natural habitats, responses to deterrents and barriers, crop preferences, etc.) in high-density areas and along the fringes of protected areas. The field personnel of the concerned departments (including the forest department) may be engaged in the monitoring and in the contribution of research data.
- Trends and efficacy of the *ex gratia* schemes
- Collaborative studies at HBLC hotspots for developing long-term measures

4. DEPLOYING MEASURES TO PREVENT HBLC

4.1 MAPPING HBLC HOTSPOTS AND MONITORING THE POPULATIONS AT HOTSPOTS

It is not feasible to individually identify a Blue Bull-in-conflict. Identification- and mapping-related measures cannot be based on the individual animal approach for the Blue Bull.

- HBLC hotspot⁶ maps (indicating low- to high-conflict areas) may be prepared and regularly updated to help create a dynamic (spatio-temporal) map of the conflict zones.
- Currently, most of the hotspot maps have been developed using data from past incidents. However, to understand the vulnerability of an area to conflict, and the probability of conflict taking place, the hotspots can be categorized as follows:
 - a. Incident hotspots: Frequency of occurrence of incidences over a specific period (such as previous 5 or 10 years), mapped over the target area. The data include the number of incidences of crop and livestock injury and loss, injury and death of humans.
 - b. Vulnerability hotspots: Cumulative index, by overlaying past incidents the vulnerability of the local community and the potential risk of the area.
- Analysis of incident hotspots will help identify factors affecting conflict incidents and therefore will help identify key factors to be used for predicting HWC hotspots.
- There is an urgent need to monitor populations of Blue Bulls particularly in and around HBLC hotspots, using standardized monitoring protocols and trained field teams. Other departments, especially the agriculture department, local universities, NGOs and research institutions may be engaged, if possible, to ensure sustainability.
- Monitoring and maintenance of water sources in and around HBLC hotspots may also be ensured as the species mostly inhabits arid regions and herds might move to human landscapes for water.
- The forest department, together with the agriculture department and other institutions, may train community PRTs to plan and maintain deterrents along the boundaries and to engage them in Blue Bull driving operations.

4.2 SUPPORT LOCAL COMMUNITIES IN CROP PROTECTION MEASURES

Education and awareness programmes may be carried out to sensitize the communities to use wildlife-friendly crop protection measures and to the need for continuous improvisation.

- Since historical habitat fragmentation and loss are very difficult to address, the most suitable mitigation measures to mitigate HBLC are effective crop protection measures, including fencing and crop guarding, to prevent Blue Bulls from venturing into croplands.
- Collaborative efforts by the SFDs and the agriculture sector, using new technology, are required to develop innovative crop protection measures.
- Although there are reported incidents of Blue Bulls jumping over fences and these animals can go through strand-based fences, fences are by far the most effective solution. Barriers such as chain-link fencing and pulsating power fences are highly effective, but they are relatively expensive to install and maintain.
- Traditional preventive measures, like constructing walls, stacks of rubble and fences of tree and shrub branches, may be adopted as these can be constructed with readily available materials and require low maintenance.
- The effectiveness of conventional and power fences may be enhanced using technological interventions, and landscape considerations, as follows:
 - Fences to be erected on the croplands abutting forest boundaries. Where the terrain does not permit continuous fencing, special design interventions (such as hanging fences over rivers or streams) may be considered. Manual guarding may be adopted during the sensitive season at the vulnerable points where either fencing is not possible or a fence is unlikely to be effective.
 - A Blue Bull fence should be a sufficiently tall chain link (woven wire) fence, a solar fence or a hybrid fence (woven wire fence with two or three strands on top). Barbed-wire fences must not be used due to the risk of serious injury to animals.
 - Chain link or woven wire fences may be made of flexible steel to minimize injury to animals hitting

⁶ "HWC Hotspots" are areas with actual or predicted repeated occurrence of HWC incidents resulting in crop-loss, livestock death, human death and injury, wildlife death and injury over temporal and spatial scales. It can be static (repeated in the same place or time) or dynamic (shift in space and time over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

the fence at speed. Where possible, the use of specialized woven galvanized fences or similar fences may be explored.

- Suitable view breakers such as thatch patches or metal plates may be used to warn the animals about the existence of the fences and avoid injuries incurred by hitting them or running into them.
 - If the fence is also meant to provide protection against Wild Pigs or any other burrowing animals, it may be grouted at least one metre below the ground, preferably with one or two electrified strands close to the ground.
 - If fencing the forest boundary is not possible or is impractical, farmers may be encouraged to go for collective fencing in order to reduce the cost.
- Even the strongest fences can be damaged by various causes. Effective arrangements for repair and maintenance may be put in place at the time of planning a fence.
 - Participatory planning, implementation, maintenance and periodic assessment of the effectiveness and necessary customization of crop guarding measures by Panchayati Raj Institutions may be encouraged.
 - The possibility of receiving financial support from existing schemes and programmes, especially the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), can be explored to facilitate the development of barriers and implement other crop protection measures.
 - The following are some deterrents that do not cause injury to Blue Bulls and yet are effective:
 - Crop guarding (manual guarding, patrolling with devices or dogs, etc.)
 - Visual or acoustic barriers (colourful or plastic ribbons)
 - Making sounds by beating drums or tins, etc.
 - Planting thorny bushes around the crop area (*Euphorbia*, *Opuntia*, *Ziziphus*, *Agave* species)

4.3 SCIENTIFIC MANAGEMENT OF BLUEBULL POPULATION AT HBLC HOTSPOTS

Effective mitigation measures along with capture at HBLC hotspots can reduce the impact on crop fields.

Mitigation measures leading to complete elimination of Blue Bull populations from a landscape with natural

habitats may not be beneficial for the health and stability of the overall agro-ecological system in the landscape. Such measures may be implemented at forest-fringe areas and human-dominated landscapes only after long-term studies have been conducted and field-evidence of the possible ecological impacts has been collected.

Site-specific solutions are required, depending on whether the Blue Bull population comes from the adjoining forests or is resident entirely on the farmland. The population connected to a forest may be a part of the prey base of the predators inhabiting the natural forest. Therefore, any mitigation measure that results in a significant reduction of the Blue Bull population may affect the predator population as well.

In addition, another factor that could determine the nature of the mitigation measures is whether the population consists of small isolated herds or it is a large contiguous population occupying a large area.

4.4 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH

Handling wild animals invariably involves a zoonotic risk. Although Blue Bulls are not known to transmit major zoonotic diseases, isolated cases of tuberculosis, rabies and brucellosis have been recorded, necessitating precautions when handling these animals.

- Hence, translocation of animals-in-conflict is to be done keeping in mind the effect on and the probability of transmission of diseases to the recipient wild population.
- The veterinary capacities and infrastructure may be upgraded to facilitate disease-monitoring in Blue Bull populations for conservation for prevention of the spread of zoonotic diseases to livestock and human populations.
- A well formulated Wildlife Health Management and Disease Surveillance Plan may be in place at every division/protected area.
- The basic approach is to integrate the concept of 'One Health'⁷, which links human and animal health in a shared environment, into all the operations and HBLC mitigation measures in the field.

⁷ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HBLC

Emergency or crisis situations can be defined as situations that are sudden, unexpected or, have the potential to be serious/are serious in nature and therefore require immediate interventions in time and space from concerned stakeholders to minimize the loss of lives and assets. In this context, such situations would include Blue Bulls foraging on crops and moving dangerously close to human habitations, posing a risk to human lives, livestock and other assets. The response to such emergencies involves prompt handling of the situations, ensuring reduced vulnerabilities of humans and Blue Bulls.

This is an indicative list of potential emergency situations:

- A Blue Bull has killed/injured a person.
- A Blue bull has damaged property/crops.
- A Blue Bull has entered a human-use area (agricultural field or settlement area).
- A Blue Bull has been injured due to retaliatory action and needs to be rescued.
- A Blue Bull has died due to retaliatory action.

Key response procedures may be established, and actions promptly implemented/undertaken for addressing emergency situations. Detailed step-by-step guidance may be developed as “Operating Procedures for Addressing Emergency response Situations”. The key emergency response procedures may include the following:

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

- A robust mechanism to promptly trigger an emergency response may be established in vulnerable divisions right from early detection of the incident to communication with key officials and information dissemination for initiation of appropriate response actions at the site.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Procedures may be laid down in each HBLC hotspot, in line with these guidelines, and in line with the institutional framework suggested under the HWC-NAP, to ensure timely coordination amongst the various response teams (the forest department, agriculture department and institutions, District Magistrate/District Collector, police, fire services, animal husbandry department, health department, SDRF, NDRF, paramilitary forces and the local community, especially local panchayat leaders and village community PRTs).

5.3 PREPAREDNESS OF RESPONSE TEAMS

- Detailed operating procedures may be laid down to ensure that the capacities and capabilities of the various response teams (community PRTs, RRTs) are adequately established and they are facilitated in their capacity development through training programmes and other measures, including training sessions on occupational health and safety.

5.4 ACTION AT THE ONSET OF AN EMERGENCY OR SPECIFIC SITUATION

- Operating procedures may be laid down to receive, channelize and disseminate information at the onset of any emergency from the site of the incident to related forest officials and the HWC Mitigation Hub. The information will be disseminated further to requisition a related response action at the emergency site.

5.5 KEY RESPONSE ACTIONS DURING AND AFTER AN EMERGENCY

- Operating procedures may be laid down, in line with the other guidelines issued by MoEF&CC, for stepwise key actions, for all emergency situations, media engagement, crowd management, addressing health emergencies and post-response operation for management of the animal. This includes ensuring the animal's health and safety during capture, transport, selection of a translocation site and monitoring the animal after the animal is released safely into the wild.

6. REDUCING THE IMPACT OF HWC ON THE HEALTH AND OVERALL WELL-BEING OF AFFECTED HUMANS

6.1 ADDRESSING A SITUATION OF LOSS OF HUMAN LIFE

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family should be made into their bank accounts.
- In the HBLC hotspots, a revolving fund may also be established, at the division-level, to ensure that funds are available for providing immediate relief to the victim/family.

6.2 ADDRESSING A SITUATION OF CROP AND PROPERTY DAMAGE

The most important manifestation of HBLC is damage to crops, property (damage to fences, houses, etc.) and other assets (livestock injury/death). Rarely, encounters may lead to human injury or death. The crop damage due to Blue Bull activities varies from state to state. Therefore, different measures may be implemented as per the situation.

A wide range of approaches could be envisaged that encourage local communities to live and prosper in a Blue Bull habitat. These approaches could be based on the principles of co-existence, co-management, participatory planning, risk assessment, strategies used to change perceptions, poverty alleviation programmes, community-based natural resource management and other forms of stakeholder engagement.

- Insurance schemes require participants to pay a premium for insurance against economic loss. This premium is determined on the basis of the risk associated with HWC/HBLC. The challenges of high premiums (due to high levels of risk) have been addressed in some areas by meeting the premiums with government or non-governmental funding support, community financing (e.g., through ecotourism) or better risk evaluation. Dialogues with the insurance sector may be initiated for providing insurance cover for damage due to HBLC. The modalities may vary from place to place according to the assessment of risk by the Insurance companies. The feasibility may be explored at the state level.
- Coordination between the forest, revenue and agricultural departments will be critical for addressing crop damage situations arising from the presence of Blue Bulls in agricultural landscapes. In areas with high HBLC pressures, a team with officials from all the three departments may be trained and empowered to employ mitigation strategies.

- Development of methodologies for crop damage assessment would be important.
- Agriculture education, research and extension institutions may include a holistic approach to HWC mitigation in their programmes to enhance awareness about crop protection measures, the schemes available for *ex gratia* payments and the procedures to be followed to avail oneself of the *ex gratia*. This will help reduce the vulnerability of farmers to crop damage arising from Blue Bull activities.
- The Ministry of Agriculture and Farmers Welfare has included crop loss by activities of wild animals under its flagship scheme *Pradhan Mantri Fasal Bima Yojana* (PMFBY), which can be used as an important HWC mitigation instrument.
- The process of *ex gratia* for crop or property loss should be transparent and simplified. Mobile apps may be used for collecting the information and for processing the claims of farmers after crop losses from Blue Bull activities to ensure efficiency and transparency in the system. Experiences and success-story sharing across states can facilitate further improvements in the system. Appropriate protocols are to be developed for speedy and objective assessment of the damage and providing relief. Sufficient delegation at the field level may be ensured to arrive at decisions and disburse the *ex gratia* payment. Any trauma due to HBLC would thereby be addressed effectively.
- Farmers may be encouraged, and facilitated through community-based institutions, to explore solutions such as changes in cropping patterns and the use of non-palatable crops. Collaborative efforts can be made to promote market-based arrangements for alternate crops, wherever feasible.
- Cooperative guarding may be encouraged, and farmers can be trained in developing and maintaining effective barriers. Community Primary Response Teams (PRTs) may be engaged to facilitate this process in their respective villages/areas of jurisdiction.
- Site-specific studies may be conducted to find out appropriate crops that are non-palatable to Blue Bulls, in collaboration with agricultural institutions.

7. REDUCING THE IMPACT OF HBLC ON THE HEALTH AND WELL-BEING OF BLUE BULLS

7.1 OVERALL CONTEXT

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Articles 48A and 51A(g)) and as per the statutory provisions made under the Indian Penal Code (Sections 428 and 429), Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.

7.2 ADDRESSING THE HEALTH AND WELL-BEING OF BLUE BULLS DURING CAPTURE AND TRANSLOCATION AND AFTER CAPTURE

One of the major complications during Blue Bull capture is mortality or morbidity due to capture myopathy, which may appear within hours, days or months after the operation. This is a result of the stress and struggle experienced by the animals during the capture.

Capture myopathy can be reduced by avoiding predisposing factors and minimizing unnecessary physical handling during mass capture operations.

- A trained wildlife veterinarian should participate in capture and translocation operations in order to deal with any unforeseen emergency that may arise.
- Customized vehicles for Blue Bulls may be designed for immediate movement of the animals from capture hotspots to rescue centres/lifetime care or translocation sites.

- The transportation vehicle may have interconnected compartments so that animals of different ages and sexes can be separated. Mixing young ones with adult males should be avoided to prevent smaller animals getting crushed. Similarly, more than one male is not to be transported together in a single compartment. The vehicle may be driven straight to the translocation site and off-loaded using a ramp that fits on the back of the truck.
- Tranquilizers may be administered to calm the animals during transportation. The animals should be handled gently but firmly at all times.
- If the captured animals are released in an enclosure, it is easier to monitor their health and behaviour. It also allows them to adapt to the new environment. The enclosures may be fenced with non-deleterious materials, and the fences may be made visible and recognizable to the animals (by using thatched matting, etc.) to make sure that the animals do not collide with them and sustain injuries.
- If captured animals are released in the wild, they may be marked for identification (using RFID tags, if available and feasible), and all encounters may be recorded and reported to a central database. If the number of translocated animals is large, running into 100 or more, a monthly assessment of the numbers released may be made to ascertain the status of the population.
- Identification-marking during release may facilitate post-capture monitoring for getting information for decision-making on mitigation measures.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN INSTITUTIONAL AND POLICY FRAMEWORK ON HBLIC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback arising from their implementation.

- The feedback arising from the use of these guidelines may, therefore, be consolidated to form the basis

for fine-tuning these mitigation measures and for understanding capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further reviewing of the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT-TESTING OF THESE GUIDELINES AND THE CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed that consisted of representatives of Government agencies, SFDs, research institutions, civil society institutions and international organizations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.

- A common understanding was developed on the overall purpose, scope, approach and methodology⁸. The experts played different roles in the drafting and editing process (Coordinating Lead Authors, Lead Authors, Contributing Authors, Review Editors). The Author Group worked on developing these guidelines between July 2019 and August 2021, during which time they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into this new document. A National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and independent wildlife and

policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and the HWC-NAP. Detailed terms of reference were provided, and meetings and workshops of the author groups were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using structured processes and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this to happen, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of these guidelines is planned to take place every 5 years from

2023 onwards. However, a mid-term review process may be desirable in 2024. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- The mechanism, templates and guidance for collating information and feedback on the use of these guidelines are to be elaborated.

8 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Ministry of Environment,
Forest and Climate Change,
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Guidelines for Human-Blackbuck Conflict Mitigation

Taking a Harmonious-Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Ministry of Environment,
Forest and Climate Change,
Government of India

Guidelines for Human-Blackbuck Conflict Mitigation

Taking a Harmonious-Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	IUCN	International Union for Conservation of Nature
BMZ	German Federal Ministry for Economic Cooperation and Development	JFM	Joint Forest Management
CWLW	Chief Wildlife Warden	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-governmental organization
DFO	Divisional Forest Officer	NTCA	National Tiger Conservation Authority
DLCC	District-level Coordination Committee	NTG	National Technical Group
DNA	Deoxyribonucleic acid	NWAP	National Wildlife Action Plan
EIA	Environment impact assessment	OPs	Operating procedures
EWRR	Early Warning and Rapid Response	PA	Protected area
GIS	Geographical information system	PCCF	Principal Chief Conservator of Forest
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	PPE	Personal protective equipment
Gol	Government of India	PRT	Primary Response Team
HBBC	Human–Blackbuck Conflict	RFID	Radio frequency identification
HOFF	Head of Forest Force (in a state)	RRT	Rapid Response Team
HWC	Human–wildlife conflict	SDRF	State Disaster Response Force
HWC-MAP	Human–Wildlife Conflict Management Action Plan	SFD	State forest department
HWC-NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SHG	Self-help group
HWC-SAP	State-level HWC Mitigation Strategy and Action Plan	SLCC	State-level Coordination Committee
IFS	Indian Forest Service	SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About The Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	6
1.4 Legal And Policy Framework for Implementing the Guidelines	6
1.5 Institutional Mechanism for Implementation of these Guidelines	6
2. Context and Situation	7
Human-Blackbuck Conflict (HBBC) refers to the negative interaction between people and blackbucks, leading to a negative impact on people or their resources such as human injury, crop damage, loss of property, apart from affecting their emotional well-being, and on the blackbucks or their habitats.	7
3. Addressing the drivers and pressures of HBBC	8
3.1 Overall Measures	
3.2 Zonation	8
3.3 Monitoring and managing habitat-related drivers and pressures	9
3.4 Measures to reduce livelihood dependence of people on grassland and scrubland	9
3.5 Scientific Management of Population at Interface Areas or Conflict Hotspots	10
3.6 Measures for cross-sector cooperation and to strengthen the role of Key Stakeholders	10
3.7 Sustainable waste management around protected areas and at HWC conflict hotspots	11
3.8 Facilitating Capacity Development Measures to Develop the Required Competencies for Addressing HRMC in the Most Effective and Efficient Manner	11
3.9 Measures to Strengthen the System of Knowledge Management Related to HBBC Mitigation	12
3.10 Systematic research and monitoring addressing HBBC	12
4. Deploying Measures to Prevent Human-Blackbuck Conflicts	13
4.1 Identification of animal in conflict and mapping conflict hotspots	13
4.2 Effective use of Early Warning and Rapid Response System	13
4.3 Population Monitoring	14
4.4 Support Local Communities and Farmers in Crop Protection and Other Exclusionary Measures, Taking a Harmonious-Coexistence Approach	14
4.5 Addressing Zoonotic and Other Emerging Diseases, Taking a One Health Approach	16
5. Addressing the Emergency Situations Arising due to HBBC	17
5.1 Establishment of Emergency Response Mechanism	17
5.2 Intra- and Inter-Agency Coordination and Cooperation	17
5.3 Preparedness of Response Teams	17
5.4 Action at the Onset of Emergency or Specific Situations	17
5.5 Key Response Actions During and After an Emergency	17
6. Reducing the Impact of HBBC on health and overall well-being of People Affected	18
6.1 Addressing Loss of Human Life	18
6.2 Addressing the Health and Overall Well-Being of Affected Humans	18
6.3 Addressing Crop Damage	18
7. Reducing the Impact of HBBC on the health and well-being of Blackbucks	19
7.1 Addressing the Health and Well-Being of Blackbucks During Capture and Translocation	19
7.2 Effective Mass Capture	20
7.3 Post-Capture Health Examination	20
7.4 Scientific Management of Population and Rehabilitation	20
7.5 Safety and Health During Capture and Translocation Operations	21
8. Use of Learnings from the Guidelines to Further Strengthen the Institutional and Policy Framework on HBBC Mitigation in India	22
9. Process of Development, Pilot Testing of These Guidelines and Consultation Process	22
10. Monitoring and Evaluation of Guidelines	22
Annexe 1	23
National Technical Group (NTG)	23
Working Group on Pilot Implementation of Guidelines and HWC-NAP	23
Author Group for drafting the guidelines	23

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on human–Blackbuck conflict (HBBC) mitigation get the overall context from the Wild Life (Protection) Act, 1972 (WPA), the Advisory to Deal with Human–Wildlife Conflicts (MoEFCC 2021) and the National Human–Wildlife Conflict Mitigation Strategy and Action Plan of India (2021–26) (HWC-NAP)¹. HWC-NAP provides the overall conceptual and institutional framework for implementing these guidelines.
- These guidelines take into consideration the existing guidelines, advisories and good-practice documents issued by various state governments and build on them to bring about a more holistic approach to HBBC mitigation.
- In addition to HBBC mitigation, the following species-specific guidelines are being developed: guidelines for mitigating human–Elephant, –Gaur, –Snake, –Crocodile, –Wild Pig, –Bear, –Blue Bull, –Leopard and –Rhesus Macaque conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human-Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient mitigation of HBBC in India, leading to co-existence, and to ensure standardization in performing mitigation operations in the most effective and efficient manner, with minimum damage to humans and Blackbucks.
- The guidelines provide advice on mitigation measures to be used to address HBBC in the long term, as well as facilitate the development, assessment, customization and evaluation of site-specific HBBC mitigation measures that are effective and wildlife-friendly.
- The guidelines serve as a basis for overall long-term planning and coordination of HBBC mitigation measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to HBBC mitigation and are not limited to state forest departments (SFDs).
- The guidelines will be able to bring in more effectiveness and efficiency when fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAP).

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTATION OF THESE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will be followed for implementing these guidelines.

1 National HWC Mitigation Strategy and Action Plan of India (2021–26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2 ‘Harmonious coexistence’ is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human–wildlife interactions on humans or on their resources and on the wildlife or on habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimizes conflict.

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence approach² to ensure that both humans and Blackbucks are protected from negative impacts of HBBC.
- The guidelines address the issue of HBBC, and in doing this they take a holistic approach. The holistic approach of the guidelines entails addressing the drivers and pressures that lead to HBBC; providing guidance on establishing and managing prevention methods; and reducing the impact of conflict on both humans and Blackbucks.
- The development of these guidelines and their intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of HBBC mitigation measures with key sectors and stakeholders at the national, state and local levels.
- The guidelines reflect on the need for a landscape approach while formulating solutions for mitigating HBBC to ensure sustainable solutions as unless comprehensive and integrated HBBC mitigation measures are implemented across the landscape, the problem is likely to only shift from one place to another.
- Efforts have been made to forge linkages with plans and guidelines of key relevant sectors for enhancing synergies and eliminating trade-offs at the field level.
- Taking a capacity development approach, the guidelines facilitate implementers by providing the Implementer’s Toolkit to provide operating procedures (OPs), formats, checklists and other field implementation aids.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines should be read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act, 1972.
- The following laws are considered directly relevant for conservation when dealing with HBBC:
 - Wild Life (Protection) Act, 1972
 - Prevention of Cruelty to Animals Act, 1960
- Sections 9, 11(1)(a) (2) (3), 12(bb), 29, 35(6) and 39(1)(a) of the WLPA 1972 are especially relevant when dealing with HBBC.
- The Supplementary Framework to HWC-NAP on Legislative Framework for HWC Mitigation in India⁶ may be referred to for more details on the specific legal provisions related to HWC mitigation.
- Other important legislations that facilitate conservation when dealing with HBBC include the Environment Protection Act, 1986; Indian Penal Code, 1860; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Environment (Protection) Act, 1986; and Disaster Management Act, 2005.

2. CONTEXT AND SITUATION

- The Blackbuck, or Indian Antelope (*Antilope cervicapra*), is native to the Indian subcontinent. It was distributed throughout the area south of the Himalaya earlier, but now it is extinct in Pakistan and Bangladesh. Two sub-species of Blackbuck are found in India: *Antilope cervicapra cervicapra*, in peninsular India, north-east into West Bengal, and *Antilope cervicapra rajputanae*, in north-west India.
- Grassland–scrubland loss and habitat destruction are the primary causes for the slow recovery of Blackbuck populations. Protected areas are a relatively small proportion of the remaining grassland–scrubland landscape. And the majority of Blackbuck populations today are found in fragmented, human-dominated landscapes that are interspersed with remaining patches of degraded grasslands or scrub habitats. Thus Blackbucks have to move between protected habitat patches, grazing lands and agricultural lands. Thus, the conservation of this species depends on managing and protecting such habitats in human-dominated landscape matrices. At present, the Blackbuck populations are larger in countryside farmlands and village commons than in any nearby protected areas.
- 'Human–Blackbuck conflict (HBBC) refers to the negative interactions between people and Blackbucks that lead to negative impacts on people or their resources, such as human injury, crop damage and loss of property. It also refers to the negative effects of the interactions on the emotional well-being of humans and Blackbucks or their habitats.
- Crop damage due to HBBC is not extensive across the range of the species; it is very localised. However, the damage can be heavy. In some areas, there has been a drastic decline in the Blackbuck population and local extinction. The total population of the Blackbuck is recovering. It was 22,000 in the 1970s and had increased to over 50,000 by 2000. The total number of mature individuals in India is believed to be 35,000 (IUCN 2017), which is the reason for the change in the International Union for Conservation of Nature (IUCN) Red List status of the Blackbuck from Vulnerable (1994–96) to Near Threatened (NT) (2003–08) and Least Concern (LC) (2017). There is a need to now conduct systematic population estimation to gain information on the population size across the range of the species, and to assess population trends.
- HBBC is resulting in damage to crops in some states such as Rajasthan, Haryana, Maharashtra, Gujarat and Andhra Pradesh.
- The Blackbuck population in some states/regions within state is declining rapidly along with the HBBC incidences, while it is increasing in some other states/other regions.
- The two contrasting cases can be seen in Rajasthan, where the population has increased greatly; however, Blackbucks have become extinct in some places in the western part of Rajasthan. The Blackbuck has thus become a species that needs strong conservation measures and conflict mitigation strategies to be protected in its habitat.
- Illegal hunting, habitat loss due to conversion of the habitat to other land-use classes and fragmentation are the primary threats to the species. Linear infrastructure is a major factor responsible for fragmentation of natural habitats. Road networks in the landscape result in mortality due to collisions with vehicular traffic in the short term, while fragmentation and population isolation result in mortality in the long term. Road accidents are responsible for the deaths of many individuals.
- HBBC mitigation measures that are effective and wildlife-friendly, need to be developed and further improved towards crop protection, including fencing, as well as procedures for capture, handling, transportation and translocation, identification of suitable habitats for relocation, and required capacity development of the personnel.

3. ADDRESSING THE DRIVERS AND PRESSURES OF HBBC

3.1 OVERALL MEASURES

HWC-NAP recommends a holistic approach to HWC mitigation in which the thematic triangle of drivers–prevention–damage mitigation is considered and addressed.

These guidelines have been prepared in line with the recommended holistic approach to bridge the current gap. Effective and sustainable mitigation of HBBC involves effective problem analysis to identify drivers and pressures of conflict. Such analysis will allow appropriate selection of mitigation measures.

- An assessment of the long-term outcomes and implications of all mitigation measures may facilitate in identifying effective and wildlife-friendly mitigation measures to address HBBC. For this, a systematic analysis of HBBC mitigation measures may be performed to assess their effectiveness and wildlife-friendliness in different types of conflict situation. This will facilitate the necessary customisation and adaptation of the mitigation measures to achieve the best possible impacts in the field.
- Cross-sectoral cooperation is critical for addressing drivers of conflict through improved land-use planning and other measures and for customising the mitigation measures.

3.2 ZONATION

- Blackbucks are often found in agricultural lands that are located at the periphery of protected areas. In the forest zone, they are shy animals and usually avoid interactions with humans. Most conflicts are reported at the interface between human areas and grassland–scrublands (grassland/scrubland fringes and agricultural settlements). In many places, the population is dependent only upon the agricultural areas.
- The zonation takes into consideration the available resources and allows the adoption of a science-based pragmatic approach to landscape-level planning for conservation and HBBC mitigation.
- **Zone 1 – Blackbuck conservation zone** – Open forest, scrubland areas and protected grasslands are part of this zone. However, as this zone is in protected areas, management interventions need to address challenges such as habitat fragmentation and degradation. All activities regarding the restoration of habitats may be undertaken in this zone. Removal of

alien species planted for the conversion of grasslands to woodlands, invasive species removal, management of grassland species, etc. may be done in this zone. Further identification of the area which is used by the species for resting or foraging and of activities to reduce disturbances, etc. will be done in this zone. As the Blackbuck population is declining rapidly in some areas, population restoration and conservation action plans for the recovery of the species will also be implemented in this zone.

- **Zone 2 – Human–grassland scrubland interface** – Most of the Blackbuck populations from this zone are responsible for agricultural loss and conflict with humans. There is an active need to manage the Blackbuck population in this zone in close collaboration with the Forest Department. Village panchayats are active stakeholders. As the original habitat of the Blackbuck is converted to human-use areas, multi-use area management needs to be developed for conserving the local Blackbuck population. The survival of the species in many states also depends on the management of this zone. Most of the barrier mechanisms (fencing), preventive mitigation measures, etc. need to be used in this zone. As a large part of the Blackbuck population is found in multi-use zones, where there are no unaltered habitats, there is a need to manage these areas for the survival of the species. It is also essential to define the conflict and areas of conservation of the species at this interface. For effective conservation planning, it is essential to prepare a predictive map of crop use by the Blackbucks and to identify high- to low-risk areas and suggest appropriate mitigatory measures accordingly.
- **Zone 3 – Blackbuck management zone** – Some populations of Blackbuck have adapted well to humans and live in refuges, agricultural fields or patches of wasteland away from protected areas. They may not have access to adequate natural habitats, and their connectivity with the potential habitat may be lost. Thus they may be dependent on these human-use areas primarily. The options of community-based conservation measures, other effective area based conservation measures (OECMs) may be explored along with the promotion of alternative crops, crop insurance, blackbuck population monitoring and effective use of barriers. In high conflict areas, measures for scientific population management of blackbuck may be explored.

3.3 MONITORING AND MANAGING HABITAT-RELATED DRIVERS AND PRESSURES

Habitat loss and fragmentation and degradation of habitats are among the primary reasons for many wildlife species moving toward human habitations. There has been a widespread loss of forests due to expansion of agriculture and plantations and increasing numbers of human habitations. With the loss of forests, the Blackbuck habitat has also become fragmented.

- As the species is primarily found in grasslands and villages wastelands and refuges, vegetation (habitat) monitoring protocols applicable to such habitats may be followed. Surveys may be conducted annually for habitat and threat assessments.
- In forest areas, critically important habitat components such as foraging areas, resting areas, and scrub forests may be monitored.
- Non-timber forest product (NTFP) collection may lead to degradation of grasslands or scrublands if not checked periodically. Thus the respective forest departments can collect data on the amounts/ weights of different NTFPs collected from different forest beats. Spreading of weeds and anthropogenic pressures, including signs of ground fires, if any, may be monitored. The remaining natural habitats, whether inside PAs or outside, may be protected and maintained. Areas of importance to the species for priority management interventions aimed at reducing conflict may be identified.
- Monitoring and maintenance of water resources in such habitats may also be carried out as the species is mostly found in semi-arid regions and herds might move to human-use areas for water.
- Areas important for the survival of remnant populations, along with nearby threats (such as human habitations, agricultural fields) may be mapped and highlighted in the management/ working plans. Refuge areas inside the villages or near them also support Blackbuck populations of and may be monitored regularly. Maintaining a refuge has a negative impact on the human-Blackbuck conflict, and thus efforts may be made to reduce or remove the Blackbucks from such habitations.
- The conversion of grasslands to woodlands (through commercial plantations or proliferation of invasive species such as *Prosopis juliflora* that reduce the extent of viable Blackbuck habitats) is also a major concern. Therefore, *Prosopis* and other woodland species need to be managed in the grasslands and other habitats close to human-use areas.

- Removal of invasive plant species is important for maintaining the health and nutritional value of grasslands and preventing the movement of local Blackbuck populations to farmlands for forage. Due to the dominance of invasive species that out-compete the native vegetation for space, there may be a reduction in the cover under native woody shrubs and suppression of native tree species, which may result in increased HBBC.
- Invasive species hotspots may be mapped on the basis of community assemblages and abundance data. The use of remote sensing data for mapping weeds may also be explored. Sites can be prioritized for restoration on the basis of their importance as foraging areas for the species and the extent of habitat degradation.
- A database may be maintained of prevailing invasive species/weeds and possible eradication strategies. It may be regularly updated, with information on eradication efforts as well.

3.4 MEASURES TO REDUCE LIVELIHOOD DEPENDENCE OF PEOPLE ON GRASSLANDS AND SCRUBLANDS

Joint Forest (Grassland) Management can be promoted in areas with resource-use overlaps between local Blackbuck populations and local communities. Alternatives to resource collection such as stall-feeding of livestock and subsidizing cattle feed may be explored and implemented.

- Eco-development activities may be undertaken by the Forest Department in collaboration with the Revenue Department, local panchayats, and block development officers for income generation and reduction of the dependence on the natural resources.
- Facilitating funds under MGNREGA or other government schemes for providing livelihoods may also be explored.
- Alternative livelihood options and promotion of higher-value alternative crops may be explored so as to improve incomes and reduce dependency.

3.5 SCIENTIFIC MANAGEMENT OF POPULATION AT INTERFACE AREAS OR CONFLICT HOTSPOTS

- A local overabundance of wildlife, including Blackbucks, may be due to a reduction in carrying capacity brought about by habitat loss, degradation and fragmentation of natural habitats. It may also be due to population growth. Or it could be a combination of both. It is therefore important to determine which factor is driving the overabundance effect so that the appropriate interventions can be selected.
- Managing local overabundance requires good knowledge and data on population size, dynamics, ranging behaviour, habitat variables, HBBC etc. SFDs may work towards building both internal capacity and collaborations with research institutes and researchers to achieve the high standards of data collection and analysis needed for the scientific management of population.
- SFDs may adopt a robust population monitoring protocol and implement it using trained field staff members or through collaborations with research institutes or local universities/colleges.
- Naturally dispersing populations that have colonized new areas need to be reviewed to see if this is a viable solution for scientific management of population. Past dispersal may be reviewed in terms of crop and property damage, adverse impacts on the well-being of people in and around the newly colonized sites, loss of Blackbuck lives (including captures) and population trends, and in terms of management inputs and challenges faced.

3.6 MEASURES FOR CROSS-SECTOR COOPERATION AND FOR STRENGTHENING THE ROLE OF KEY STAKEHOLDERS

Cross-sectoral cooperation for HBBC mitigation entails engaging multiple stakeholders from different sectors and domains at the national, state, landscape and district/forest division levels. The following measures are envisaged:

- State-level Coordination Committees (SLCC), landscape-level multi-stakeholder fora and District-level Coordination Committees (DLCC) may be used to strengthen the inter-agency coordination required for HBBC, and a district-specific operational mechanism may be developed to address specific needs of HBBC mitigation.

- Communities that are significantly affected by HBBC (farmers, villagers) may be encouraged to organise themselves into community support groups to back the joint mitigation initiatives with the local forest department.
- There are several religious views associated with the Blackbuck. The species is also restricted in its distribution. Both these factors make the Blackbuck an attractive species for community-based eco-tourism. The community eco-tourism model set up in many states may be used in areas with high levels of crop foraging to provide alternative employment to the local communities, in cooperation with the Tourism Department.
- Local NGOs working towards conservation and animal welfare can especially play an important role in spreading awareness, as well as implementing the HBBC mitigation strategies in partnership with the local administration and Forest Department.
- The Education Department, research institutions and the Forest Department may undertake awareness generation and outreach programmes, especially on the role played by the Blackbuck in the ecosystem.
- Researchers and scientists with experience in working with the species and with experience with its behaviour can help prepare pamphlets and education material for communities.
- Besides involving local communities and various stakeholders in mitigating HBBC, creation of awareness and community education are extremely important.
 - Mobilizing volunteers (like Vanya Praani Mitra) for interacting with the public, to create an interface with the Forest Department and to carry out preliminary steps for mobilizing local help in case of emergencies.
 - Creating awareness about effective fences and demonstrating such fences in villages may be carried out by such institutions for effective Blackbuck conflict mitigation.
 - Encouraging communities to change the cropping pattern to crops that are not preferred by Blackbuck, such as oilseeds, sunflower, cotton or mustard (or even combination of crops, with preferred ones grown in rows or guarded by non-preferred crops) in impacted areas.

- Information campaigns may be carried out on conservation-friendly practices, cultivation of suitable species that do not attract wildlife and the steps to be taken when one comes across any wildlife. Human activities that may deter wildlife from approaching close to human habitations are to be encouraged.
- Regular meetings of field functionaries may be organised on the status and difficulties related to HBBC.
- Signage may be placed in the conflict locations identified to create awareness about precautionary measures to be taken when there are encounters with Blackbucks.

3.7 SUSTAINABLE WASTE MANAGEMENT AROUND PROTECTED AREAS AND AT HWC CONFLICT HOTSPOTS

- Waste bins and garbage dumps can result in a flourishing population of feral dogs in the area. Such dogs are responsible for killing Blackbuck fawns in fringe areas, multi-use areas, etc. The Forest Department may work with the local communities, village panchayats and municipalities to reduce waste/garbage accumulation at the grassland–village edge and dispose of waste appropriately.
- Due to a variety of reasons, animals might move to village areas holding crop residues and other plant waste. Their movements close to/across roads can also result in vehicular collisions. Thus, ensuring a garbage-free environment may reduce threats to Blackbucks and to domestic animals that graze closer to such areas. The frontline staff and PRT teams may periodically inspect the forest periphery for signs of garbage disposal. In human-use areas, village panchayats may be involved in periodic inspections. SFDs may coordinate with the local administration for the overall organization of local markets, waste management and disposal such that wild animals are not attracted. SFDs may generate awareness among local communities on the need for waste disposal and its role in reducing conflict.
- Where some Blackbucks have become habituated to foraging inside villages and towns in search of garbage, ‘aversion conditioning’ may be tested if they do not stop this behaviour even after the garbage is no longer available.

3.8 FACILITATING CAPACITY DEVELOPMENT MEASURES TO DEVELOP THE REQUIRED COMPETENCIES FOR ADDRESSING HRMC IN THE MOST EFFECTIVE AND EFFICIENT MANNER

To ensure that HBBC mitigation measures are planned and implemented with animal welfare and ethical considerations, as well as the safety and health of the response teams and other field personnel in mind, the SFDs may ensure that all response team personnel from the Forest and other line departments and agencies are brought under a systematic approach to capacity development, in line with the *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*³.

- Regular and systematic specialized training programmes may be conducted for critical operations such as rescue, capture and translocation jointly with other key departments in the form of mock-drills and simulation training sessions.
- Advanced training programmes related to animal welfare issues may be conducted for all the personnel of the Rapid Response Teams.
- The competencies of the members of RRTs may be reviewed on a regular basis and their training curriculum is to be fine-tuned and updated regularly.

³ *Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams*, available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3.9 MEASURES TO STRENGTHEN THE SYSTEM OF KNOWLEDGE MANAGEMENT RELATED TO HBBC MITIGATION

To ensure that HBBC mitigation measures are effective and sustainable, it is essential that not only are field experiences, learnings, field-evidence and conceptual advances shared across key stakeholders and landscapes but also that such knowledge is documented for utilisation in future strategies and plans related to HBBC mitigation.

- The National HWC Mitigation Forum, landscape-level multi-stakeholder fora and appropriate working groups may be used to share field experiences, learnings, evidence and conceptual advances within the Forest Department, across stakeholders and across landscapes.
- Measures may be put in place to systematically document field experiences, learnings, field-evidence and conceptual advances related to HBBC mitigation to inform future HBBC mitigation strategies and plans.

3.10 SYSTEMATIC RESEARCH AND MONITORING ADDRESSING HBBC

HBBC is extremely challenging considering that the original habitats of the species have shrunk drastically and large fragments of the population reside in multi-use areas. There is also a problem in controlling overabundance where there are high levels of crop foraging. The species is facing the threat of extinction in many regions, while becoming a species-in-conflict in some other areas.

Some of the priority areas for research are listed here:

- A comprehensive assessment of the Blackbuck distribution to assess the total population of the species and the population trends in different regions, including protected areas.
- Studies that examine drivers of HBBC, an understanding of how animals use multi-use landscapes, and which kinds of crop fields are preferred can help arrive at a predictive framework to understand the vulnerability to crop foraging by the species.
- The carrying capacities of the protected and classified grasslands and multi-use areas supporting the species, not including agricultural areas.

- Community-based traditional mitigation measures, including listing traditional/local varieties of crops that are not preferred by Blackbucks.
- Effectiveness and wildlife-friendliness of HBBC mitigation measures and Blackbucks' responses to these measures.
- How different mitigation measures impact the Blackbuck (changes in resource use, health and HBBC).
- Estimation of crop loss caused by Blackbucks and zonation based on the intensity of loss.
- A comprehensive population estimation in each region, forest and multi-use zone.
- Conservation plans for areas with a declining population of the species.
- Long-term implications for the families affected by crop loss in areas with high HBBC levels.
- Long-term impact of HBBC (crop loss and well-being) on households close to Blackbuck habitats (priority areas being conflict hotspots).
- Developing tools and strategies to implement Immuno-contraception.
- Developing predictive models to identify future conflict hotspots.
- Management of multi-use areas for the survival of the species and reduction of HBBC.
- Effect of livestock grazing in Blackbuck habitats.

4.

DEPLOYING MEASURES TO PREVENT HUMAN-BLACKBUCK CONFLICTS

4.1 IDENTIFICATION OF ANIMALS-IN-CONFLICT AND MAPPING CONFLICT HOTSPOTS

The type of conflict and the solutions depend on where the conflict is occurring and what its impacts on people and Blackbucks are.

4.1.1 Identification of animals-in-conflict

Individuals or groups of Blackbucks-in-conflict may be characterised as casual (opportunistic) or repeated (obligatory) crop forager. It is not feasible to individually identify an animal in a conflict situation, but it is possible to find proof of Blackbuck activity through signs of crop foraging such as digging, uprooting, trampling and harm inflicted through any human injury. Therefore, mitigation measures/solutions cannot be based on the individual animal approach in the case of the Blackbuck. Another way of addressing an individual-in-conflict or a group-in-conflict is to check if particular populations are habitual crop foragers of particular places. This could help decide if relocating a herd, if feasible, to another place could be resorted to. The following steps may be taken for identifying Blackbucks that cause conflict:

- The movement areas of the above-mentioned categories of Blackbuck within croplands may be demarcated or mapped, including tracking marks and other distinct signs, to confirm the presence and absence of Blackbucks.
- Investigate all conflict-related incidents within the region.
- Deploy a number of cameras at strategic locations, depending on their predicted movements. A few of the camera traps can be with a white flash and infrared flashes, a few of them being in still mode and a few of them being video mode.
- Investigate the existing camera trap and identify the individual based on distinct morphological identification features and short-list Blackbucks on the basis of the frequency of occurrence.

4.1.2 Identifying hotspots of HBBC

- HBBC hotspots⁴ can be identified and mapped as follows:
 - Incident hotspot – Frequency of occurrence of incidences over the past specific 5 or 10 years, mapped over the target area. The data include the number of incidents of crop loss, injury and death of domestic animals.
 - Vulnerability hotspot – Cumulative index obtained by overlaying past incidents, vulnerability of local community and potential risk of the area.
- An analysis of incident hotspots will help identify factors affecting conflict incidents and, therefore, will help identify key factors to be used for predicting HBBC hotspots. In forest fringe–agriculture interface areas–refuges, the FD may also document the pattern/incidences of foraging (entry and exit routes, crops/ areas foraged, the number of individuals, size, etc.) through PRT teams or other FD staff members or by installing monitoring systems/camera traps at hotspots.

4.2 EFFECTIVE USE OF EARLY WARNING AND RAPID RESPONSE SYSTEM

An “Early Warning and Rapid Response (EWRR)⁵” system may be established and used to enhance the overall efficiency of the mitigation efforts in the field. For preventing HBBC, a modern early warning system (with passive infra-red sensors and barriers) based on landscape consideration may be planned.

- As the Blackbuck is a Schedule I species under WPA 1972, only the CWLW can give necessary orders for driving in areas where Blackbucks feed on crops. Therefore modalities may be devised for the issue of immediate orders. RRT members can help village communities and farmers with driving operations. These RRTs and PRTs may hold regular meetings with local governing bodies and institutions to review of the situation, and to ensure that there is joint preparedness to handle any large-scale HBBC mitigation exercise.

4 “HWC hotspots” are areas with actual or predicted repeated occurrences of HWC incidents resulting in crop-loss, human death and injury and wildlife death and injury over temporal and spatial scales. Such hotspots can be static (in the same place or time) or dynamic (shifting in space and time over years). In addition to count statistics, the magnitude of the incidents is subjected to interpolation or extrapolation techniques to define the hotspots in space and time.

5 EWRR is a set of tools, processes and personnel competencies needed for timely and meaningful generation and dissemination of alert information to individuals, communities and establishments at risk for optimal preparedness and responses at the appropriate time to reduce the likelihood of injury, death or crop damage.

4.3 POPULATION MONITORING

- Few efforts have been made to estimate the Blackbuck population across India. There is a need to assess Blackbuck populations particularly in areas close to the hotspots.
- A suitable scientific protocol for monitoring Blackbuck populations in affected areas may be prepared in consultation with competent wildlife biologists, and the monitoring staff may be adequately trained in implementing the protocol. As far as possible, local universities, NGOs, and research institutions may be involved in population monitoring.
- Population monitoring of Blackbucks may be conducted with a focus on the human-use landscapes as the species continues to occupy common lands/crop lands. The Agricultural and Revenue departments, being key stakeholders in HBBC mitigation, may be involved in the population estimation.
- Blackbuck populations in grassland/scrubland habitats, human multi-use areas and refuges may be monitored regularly to keep track of changes in the population.
- Blackbuck population monitoring may not be limited to protected areas or state-owned land but may also be done in human-use areas, including but not limited to farmlands, fallow lands, scrublands, wastelands, etc. Volunteers/representatives of village youth or members of community PRTs, if any, may be involved in annual population monitoring drives.
- The males of the species usually forage alone, while the females forage in groups. Crop foraging behaviours in relation to crop availability, responses to deterrents/barriers, crop preference, etc. can be additional information for devising mitigation methods or crop alternatives for the fringe areas.
- Efforts may be made, in cooperation with the agriculture sector, to understand the crop foraging behaviour of herds and individuals on the basis of both species-specific and landscape-specific factors (availability of food in natural habitats, response to deterrents and barriers, crop preferences, etc.) in high-density areas and in the fringes of protected areas.
- The natural habitat of the Blackbuck has mostly been converted to plantations of commercially important tree species and agricultural and horticultural land classes. Natural forests that still provide refuge to populations frequently visiting crop fields may be

identified and restored. Monitoring and maintenance of water resources in such habitats may also be carried out as the species mostly inhabits arid regions and herds might move to human landscapes for water.

4.4 SUPPORT LOCAL COMMUNITIES AND FARMERS IN CROP PROTECTION AND OTHER EXCLUSIONARY MEASURES, TAKING A HARMONIOUS-COEXISTENCE APPROACH

The traditional methods used by farmers to stop crop foraging by Blackbucks include physical guarding, using scarecrows and guard dogs, spraying foul-smelling materials, faecal matter, etc. and erecting brushwood fences, rubble walls and thorn fences. Live bio-fences of *Euphorbia neriifolia* (Thor), *Acacia senegal* (Kumhat) and *Prosopis juliflora* (Vilayati Babul) are also popular. However, as these species are also invasive, such bio-fences may be monitored and trimmed from time to time. Running audio with fox lights creates a buzzing sound in high winds, which is also considered effective. Traditional acoustic deterrents used by farmers in some areas involve creating noise by shouting, and other means. Visual deterrents consist of lengths of coloured cloth strung on fences on the periphery of fields.

- The Forest Department and Agricultural Department may work with the communities to spread awareness about deterrents and provide technical skill. As the animals may quickly be habituated to these deterrents, there is a need to keep improvising and changing deterrents and to carry out community guarding.
- Farmers may be supported in crop guarding by encouraging the practice and by subsidising measures such as trip wire alarms/passive infra-red sensors. Synergies, with funding such measures under MGNREGS, may be explored.
- Apart from traditional crop protection techniques used by farmers, site-specific solutions may be required to deal with the problem, depending on whether the Blackbucks-in-conflict come from the adjoining grassland or scrubland or is resident entirely on the farmland; and whether the population consists of small isolated herds or is a large contiguous population occupying a large area.
- Blackbuck foraging on crops is common in the summer as these animals face a reduction of food and water in their natural habitats. To stop the foraging, fencing the area, planting wild food plants and creating water bodies in their natural habitats or wild refuges/ common lands outside croplands are needed.

- In areas where repeated crop foraging by Blackbucks occurs, farmers can be encouraged to grow less vulnerable crops, according to the climatic factors of the region. In some dry regions, crops such as sunflower (*Helianthus sp.*), Kasumbi (*Carthamus tinctorius*) and castor (*Ricinus sp.*) may be encouraged in place of highly susceptible crops such as peanut, wheat, cotton and sorghum.
- Traditionally farmers have used various methods such as fencing with tree and shrub branches and stringing smooth wire with polythene bags hanging from them between poles and using effigies, guard dogs, watchmen, night lights, various sounds, often in combination, to prevent crop foraging by Blackbucks. Farmers can be facilitated to use and further strengthen these methods.
- Although Blackbucks are known to be able to jump over fences and can also go through strand-based fences (electric and barbed wire), fences may by far be the most effective, though rather expensive, solution. Only a few animals will probably be able to cross fences at any time, and managing such animals will be much easier than keeping the farmlands unfenced. Farmers may be discouraged, through awareness campaigns, on the use of fences made of materials that may harm Blackbuck or other animals. .
- The following approach to fencing for HBBC mitigation is recommended:
 - Fences may be erected on forest boundaries abutting croplands facing severe conflicts. Where the terrain does not permit continuous fencing, special design interventions (such as hanging fences over rivers or streams) may be considered. Manual guarding may be adopted during the sensitive season at vulnerable points where either fencing is not possible or a fence is unlikely to be effective.
 - A Blackbuck fence may be a sufficiently tall chain-link (woven wire), or solar fence. Barbed wire fences should not be used because of the risk of serious injury to animals.
 - Chain-link or woven wire fences may be made of flexible steel to minimise injury to animals hitting the fence at speed.
 - Suitable view breakers such as thatch patches or metal plates may be used to warn the animals about the existence of the fences and avoid injuries by hitting them or running into them.
- A solar fence may be used only when its maintenance and a 24x7 pulsating power supply are assured.
- If the fence is also meant to provide protection against Wild Pigs or any other burrowing animals, it may be grouted at least one metre below the ground, preferably with one or two strands close to the ground.
- If fencing is not possible or is impractical on the forest boundary, farmers may be encouraged to go for collective fencing in order to reduce costs.
- In high-conflict areas where breaching may occur or fencing is not possible, manual guarding may be adopted during the sensitive season.
- Even the strongest fences can be damaged for various reasons. Effective arrangements for repair and maintenance may be put in place at the time that a fence is being planned. Community-based management of fences may be encouraged.
- State governments may consider subsidising suitable fences to encourage the adoption of such fences, or the possibility of bringing the fence construction under MGNREGS can be explored.
- There are other exclusionary devices or methods. These methods list some deterrents that do not injure Blackbucks and are not fatal to them.
 - Scare devices (beating of drums or tins; guard animals like dogs)
 - Spraying of local repellent solutions
 - Planting of thorny bushes around the crop area (*Euphorbia*, *Opuntia*, *Ziziphus*, *Agave* species)
 - Coconut ropes soaked in a mixture of sulphur and repellent oil
- In addition to the listed repellents, a large number of olfactory, acoustic and gustatory repellents have been developed to decrease Blackbuck damage; however, most testing results have shown that Blackbuck become habituated to these repellents. The effectiveness of most of the methods listed here depends upon the scientific use of the method in the field.

4.5 ADDRESSING ZONOTIC AND OTHER EMERGING DISEASES, TAKING A ONE HEALTH APPROACH

The response teams and other stakeholders at HWC hotspots may be vulnerable to a variety of zoonotic diseases that can be transmitted from different animals. There is also a risk of disease transmission between domestic animals and wildlife and a risk of disease transmission between humans and domestic animals:

- Veterinary capacities and infrastructure may be upgraded, to facilitate disease monitoring in Blackbucks, for Blackbuck conservation and to prevent zoonotic diseases from spreading to livestock and human populations.

- A well-formulated Wildlife Health Management and Disease Surveillance Plan may be in place at every division/protected area.
- All personnel involved with capture operations may be trained, vaccinated and equipped.
- The basic approach may be to integrate the concept of ‘One Health’⁶, which links human and animal health in a shared environment, into all the operations and HBBC mitigation measures in the field.

⁶ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment

5. ADDRESSING THE EMERGENCY SITUATIONS ARISING DUE TO HBBC

An indicative list of the potential emergency situations ⁷ in decreasing order of priority follows:

- i. A human has been killed/injured..
- ii. A Blackbuck has damaged property/crops.
- iii. A Blackbuck has entered human-use areas (agriculture fields or settlement areas).
- iv. A Blackbuck death has occurred due to retaliatory action.
- v. An injured Blackbuck is being rescued.

Key response procedures may be established and actions promptly implemented/undertaken for addressing emergency situations. Detailed step-by-step guidance may be developed as “Operating Procedures for Addressing Emergency Response Situations”.

The key emergency response procedures are presented in the following sections.

5.1 ESTABLISHMENT OF EMERGENCY RESPONSE MECHANISM

- HBBC may not require regular emergency response, unlike conflicts involving other animals. However, sometimes the situation develops into an emergency when a Blackbuck turns aggressive. In such rare cases, a quick response from community-level PRTs/ RRTs is necessary.
- A mechanism is required at each division for communicating with key officials and for communicating information for initiation of appropriate response actions at the site of the incident.
- Helplines may be set up for the public to report information in case of any conflict situation requiring the support of the SFD. Hubs may be in place for receiving the information and transmitting it onwards for quick responses. The hubs may be set up in easily accessible locations.

5.2 INTRA- AND INTER-AGENCY COORDINATION AND COOPERATION

- Procedures may be laid down in each division, in line with these guidelines, to ensure timely coordination amongst the response teams as well as with key stakeholders such as local NGOs and the Animal Husbandry, Agriculture and Health departments, under the DLCC.

5.3 PREPAREDNESS OF RESPONSE TEAMS

- Operating procedures may be laid down in detail to ensure that the capacities and capabilities of the various response teams (Community PRTs, RRTs) are established and their capacity development is facilitated through training programmes and other measures, including training sessions on occupational health and safety.
- Operating procedures may be laid down with specifications to ensure that each response team is sensitised and equipped with appropriate and adequate response equipment and personal protective equipment (PPE kits), in view of effective zoonotic disease and pandemic prevention, management and control.

5.4 ACTION AT THE ONSET OF EMERGENCY OR SPECIFIC SITUATIONS

- Operating procedures may be laid down to receive, channelise and disseminate information at the onset of any emergency, from the site of the incident to related forest officials and the HWC Mitigation Hub and to disseminate the information to requisition-related response actions at the emergency site.

5.5 KEY RESPONSE ACTIONS DURING AND AFTER AN EMERGENCY

- Operating procedures may be laid down for step-wise key actions (media engagement, crowd management, addressing health emergencies and post-response operations for management of animals) for all emergencies. This includes ensuring the animal's health and safety during capture and transport to a translocation site and monitoring the animal after it is released safely back into the wild.

⁷ Emergency or Crisis situations can be defined as situations which are sudden, unexpected, have the potential to be serious/are serious in nature and therefore require immediate intervention in time and space from concerned stakeholders, to minimize loss of lives and assets

6. REDUCING THE IMPACT OF HBBC ON HEALTH AND OVERALL WELL-BEING OF AFFECTED PEOPLE

6.1 ADDRESSING LOSS OF HUMAN LIFE

The dimensions of human death are manifold. It is not simple to fathom what the loss of human life means to the family of the victim. The primary assumption behind an *ex gratia* payment is that the loss of the life of any individual cannot be compensated. Therefore, any amount paid to the family of the victim is mere consolation. The following measures may be implemented:

- Part of the *ex gratia* payment may be made immediately to the victim's family/heirs, and the balance payment may be made at the earliest.
- The payments to the victim's family may be made in their bank accounts through Direct Benefit Transfer.
- In HBBC hotspots, a revolving fund may also be established, at the division-level, to ensure the availability of funds for providing immediate relief to victims/families.

6.2 ADDRESSING THE HEALTH AND OVERALL WELL-BEING OF AFFECTED HUMANS

- In the case of injury resulting from an encounter with a Blackbuck, the victim needs to be immediately hospitalised and an *ex gratia* payment paid, as per the state government's norms.
- Professional counselling by qualified psychiatrists/health workers may be useful in checking the effects of such traumatic incidents.
- The SFDs and other government agencies/institutions may organise some counselling sessions for such victims and support them as they come out of the psychological impact.

6.3 ADDRESSING CROP DAMAGE

The assessment of a crop compensation amount is complex. Payment of inadequate compensation to farmers will lead to resentment among humans, leading to adverse impacts on wildlife conservation and retaliatory killings. Payment of compensation might also lead to laxity in crop protection and inhibit innovations in crop guarding.

- The Ministry of Agriculture and Farmers Welfare has included crop loss resulting from activities of wild animals under its flagship scheme, *Pradhan Mantri Fasal Bima Yojana* (PMFBY), which may be used as an important HWC mitigation instrument.
- The process of settling crop or property loss compensation should be transparent and simplified. Mobile apps may be used for collecting the information and processing claims of farmers after crop losses are sustained due to Blackbuck activities to ensure efficiency and transparency in the system. Experiences and success-story sharing across states may facilitate further improvements in the system.
- Farmers may be encouraged, facilitated through community-based institutions, to explore solutions such as changes in cropping patterns, using non-palatable crops, etc.
- Collaborative efforts may be made to promote market-based arrangements for alternate crops, wherever feasible. Community Primary Response Teams (PRTs) may be engaged to facilitate this process in their respective villages/areas of operations.
- Site-specific studies may be conducted to find out appropriate crops that are non-palatable to Blackbucks, in collaboration with agricultural institutions.
- Appropriate protocols may be developed for assessment of damage and providing relief.

7.

REDUCING THE IMPACT OF HBBC ON THE HEALTH AND WELL-BEING OF BLACKBUCKS

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (Article 48A and 51A(g)), and as per the statutory provisions made under the Indian Penal Code (Sections 428 and 429), the Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)), the Motor Vehicles Act 1978 (Transport of Animal) Rules, 2001) and guidelines issued by the MoEF&CC.

7.1 ADDRESSING THE HEALTH AND WELL-BEING OF BLACKBUCKS DURING CAPTURE AND TRANSLOCATION

- Translocation of the captured individuals may also translocate the HBBC to new locations, and therefore the decision may be based on scientific data (areas where the species is not present should thus be avoided totally; areas where other Blackbuck populations are present should be reviewed; Blackbuck should rarely be maintained in captive care facilities; and so forth).
- The decision about translocation, lifetime care or use of reproductive control methods in Blackbucks may be taken before the capture operation.

7.1.1 Potential Capture Techniques

- As it is a shy animal, darting a free-ranging Blackbuck is quite difficult. Presently, the most prevalent capture option available is called the boma technique. It has been tried by many states for ungulates.
- Nets (drop nets, drive nets, net guns, etc.) are widely used in capturing mammals in other countries but have not been tested adequately in India. Drop nets may be tried that have been widely used in capturing herbivores in other parts of the world with due caution as there is a likelihood of 'capture myopathy'.
- Chemical capture techniques may also be used for Blackbucks. This method is more useful in capturing individual animals rather than entire herds. It may also be used as a supplementary technique during mass capture/boma capture protocols, either in the case of Blackbuck health emergencies or during biological/disease sampling processes.
- All captures should be done with care and under expert supervision as these procedures may inflict injuries to the animals as well as the handlers/staff members involved.

7.1.2 Translocation including handling, transportation, monitoring and management

- Solitary Blackbucks can be darted and translocated with ease; however, since most Blackbucks usually move in a group, darting is not always a feasible option.
- Care is needed in this method as it involves physical restraint and may cause minor to fatal injuries. Disentangling the animals from the nets is generally a challenge, as there is a possibility that they may end up with broken limbs or succumb to capture myopathy.
- If the animals are to be captured and translocated, a lot of training under expert supervision will be required. Roles may be assigned to the members of the team. Driving (herding) and loading methods may be standardised through repeated testing.
- The equipment may be manufactured or procured exactly as per specifications. Its use may be rehearsed and practised. The inventory of equipment may be checked against a checklist before departing for the field.
- The capture equipment (depending on the capture techniques to be used) – stretchers, ropes, drive nets, drop nets, canon nets, dart guns, drugs, etc. – may be checked regularly and before capture operations.
- Customised vehicles may be designed for immediate movement of Blackbucks from capturing hotspots to rescue centres/lifetime care or translocation sites.
- The transportation truck may have interconnected compartments so that different ages and sexes can be separated. Mixing young ones with adult males should be avoided to prevent smaller animals being crushed. Similarly, more than one male in a single compartment should not be transported together. The truck may be driven straight to the translocation site and unloaded using a ramp that fits the back of the truck.
- The equipment required would depend on the mitigation strategy to be implemented, i.e., whether the animals are to be translocated or not. While customising the equipment, the items may be procured bearing in mind the size, behaviour and physiology of the species. Mass-capture techniques may be integrated into the capture and translocation protocols.

- The captured animals may be released into the wild after proper identification marking or using RFID.
- Unless the release area is large enough to provide sufficient scope for exploration by the new arrivals, they may be released in an enclosed area for some time so that they develop some attachment to the location. This may keep them from wandering out of the release site. It is advisable to retain the animals inside a fenced area of sufficiently large size to prevent them from entering crop fields and foraging on the crops again.

7.2 EFFECTIVE MASS CAPTURE

- Mass capturing Blackbuck from the wild is not only challenging, but it can also be a potentially dangerous procedure for both the animals and the personnel involved if not executed appropriately. In the absence of a remote-activated wireless commercial trapping system, the indigenous trapping system using a gate and fence can be considered. Trail camera surveillance may be carried out at the conflict site, and bait may be used to bring the animals into a trap.
- When capturing such species for fertility control and translocation initiatives, the capture team should maximise the efforts to trap the entire group, to minimise the impact of removing individuals on the welfare and social interactions of both the individual and the group.
- Drop nets/corral traps may be used for mass capturing Blackbucks, after standardising the techniques, without breaking groups.

7.3 POST-CAPTURE HEALTH EXAMINATION

- One of the major complications during Blackbuck capture is mortality or morbidity due to capture myopathy, which may appear within hours, days or months after the operation. This is a result of the stress and struggle experienced by the animals during capture. Capture myopathy can be reduced by avoiding predisposing factors and minimising unnecessary physical handling during mass capture operations.
- If the animals are released in an enclosure after capture, a regular watch may be kept on their numbers and health condition.
- The fence of the enclosure should be made clearly visible to animals by providing a shade net, thatch matting, etc. so that the animals do not hit it while running.

- If the Blackbucks are released in the wild, they may be marked for identification, and all encounters may be recorded and reported to a central database.
- If the number of translocated animals is large, 100 or more, a monthly assessment of the released population size may be made to ascertain its status.
- A trained wildlife veterinarian should always be part of capture operations to deal with any unforeseen emergency that may arise.

7.4 SCIENTIFIC MANAGEMENT OF POPULATION AND REHABILITATION

- In many conflict areas, deterrence has worked during the initial implementation but has lost its effectiveness quickly. Long-term scientific management of population is the major intervention needed in areas of high conflict.
- Natural predators of the Blackbuck can slow down the rate of increase of Blackbuck populations. Hence, maintaining the prey–predator balance is a significant management strategy. Translocations can be an effective means of reducing conflict but only to those areas where the species is present in small numbers and there is a low probability of conflict due to the translocations.
- Regular mass captures can provide relief to the conflict areas, but non-lethal methods of scientific management of population need to be examined as an option for actively managing the species.

7.4.1 Post-rehabilitation Monitoring

- The animals may be regularly monitored before and after capture and release for any abnormality.
- Tranquilisers may be administered to calm the animals during translocation. The animals should be handled gently but firmly at all times. It may be easier to monitor the health and behaviour of the captured animals if they are released in an enclosure. It also allows them to adapt to the new environment. The enclosures may be fenced with non-deleterious materials, and the fences may be visible and recognisable to the animals (by using fluorescent cloth, thatched matting, etc.) to make sure that the animals do not collide with them and cause injury to themselves.
- Before the animals are released to the wild, they may be properly marked and their population status may be monitored and recorded. Blackbucks may be monitored with markers such as radio collars and coloured body markings or coloured ear tags in order

to ensure that they stay in the target area and do not stray into croplands again.

- As far as possible, translocated animals may be released only in a fenced location unless the release area is very extensive.
- If the animals are released in the wild, they may be marked for identification (RFID) and all encounters may be recorded and reported to a central database.
- If the number of translocated animals is large, 100 or more, a monthly assessment of the released population size may be made to ascertain its status.
- Even if the animals are translocated for reducing crop losses, care may be taken that they get a fair chance to adapt to the new location.

7.5 SAFETY AND HEALTH DURING CAPTURE AND TRANSLOCATION OPERATIONS

- In most cases, Blackbucks will rather flee than confront a human being. The majority of incidences happen when the Blackbucks feel threatened or cornered, is also anticipated during capture or translocation procedures. Most injuries are on the legs and feet and vary from minor to fatal. Fatal injuries from Blackbuck attacks are generally due to blood loss. Although injuries are not always fatal, they can be extensive and are primarily lacerations. Severe toxæmia can result from injuries. Therefore, proper medical care is necessary. Before carrying out a capture and translocation programme, all the staff members involved should be trained and briefed about the hazards of the procedure and the accidents that can happen.
- All the team members involved in capture, translocation or any other procedure to mitigate conflict that requires direct or close contact with the animals may get exposed to a variety of diseases and hazards. The team may be thoroughly briefed about these diseases, and provided with preventive measures such as wearing gloves, masks or PPEs.

8. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK RELATED TO HBBC MITIGATION IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback arising from their implementation.

- The feedback arising from the use of these guidelines may, therefore, be consolidated to form the basis for fine-tuning these mitigation measures and

for understanding capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further revising/updating the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

9. PROCESS OF DEVELOPMENT, PILOT TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed that consisted of independent wildlife policy experts and representatives of government agencies, SFDs, research institutions, civil society institutions and international organizations. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology.⁸ The experts played different roles in the drafting and editing process (Coordinating Lead Authors, Lead Authors, Contributing Authors, Review Editors). The Author Group worked on developing these guidelines between July 2019 and August 2021, during which time they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the existing documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. A National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ)

and independent wildlife and policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and the HWC-NAP. Detailed terms of reference were provided, and meetings and workshops of the author groups were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using structured processes and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEFCC in December 2022, consisting of officials from MoEFCC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

10. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years from 2023

onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- Detailed mechanism, templates and guidance used for collating information and feedback on the use of these guidelines may be developed.

8 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

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Government of India

Guidelines for Cooperation between the Forest and Media sector in India

Towards effective communication on Human–Wildlife Conflict Mitigation

Taking a Harmonious Coexistence Approach



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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Cooperation between the Forest and Media sector in India

Towards effective communication on Human-Wildlife Conflict Mitigation

Taking a Harmonious Coexistence Approach

Abbreviations

BCCC	Broadcasting Content Complaints Council	MoEFCC	Ministry of Environment, Forest and Climate Change
BMZ	German Federal Ministry for Economic Cooperation and Development	NBA	News Broadcasters Association
DPSIR	Drivers-Pressures-State-Impact-Response	NBSA	News Broadcasting Standards Authority
FD	Forest Department	NGO	Non-Governmental Organization
GIS	Geographical Information System	NTG	National Technical Group
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	NWAP	National Wildlife Action Plan
HWC	Human Wildlife Conflict	OPs	Operating Procedures
HWC-MAP	Human Wildlife Conflict Management Action Plan	PR	Public Relations
HWC-NAP	National Human Wildlife Conflict Mitigation Strategy and Action Plan	RGO	Resident Grievance Officer
HWC-SAP	State-level HWC Mitigation Strategy and Action Plan	SFD	State Forest Department
MIB	Ministry of Information and Broadcasting	SHG	Self-Help Group
		SOPs	Standard Operating Procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	2
1.1 Purpose, approach and scope	2
1.2 Legal and Policy framework for implementing the Guidelines	2
1.3 Institutional Framework for implementing the guidelines	2
2. Context and Background	3
3. Forest-Media Cooperation: measures to be implemented by Media sector	4
3.1 Overall measures	4
3.2 Addressing specific challenges that wildlife managers face in engaging with media on HWC issues:	4
3.3 Role of Filmmakers and photographers in contributing to long-term efforts on HWC mitigation:	5
3.4 Occupational safety and health, ethical issues and other considerations:	5
3.5 Specific communication tools to be used by media for effective engagement with wildlife managers	5
4. Forest-Media Cooperation: measures to be implemented by Forest sector	6
4.1 Overall measures	6
4.2 Measures to ensure dissemination of correct information and build relationships with media professionals	6
4.3 Field visits help generate authentic reports	6
4.4 Nodal person from forest department	6
4.5 Addressing the CHALLENGES, the media encounters during HWC communication and reporting	7
4.6 dynamics of regional Media	7
4.7 Key points to ensure that the message from the wildlife managers is communicated well in the media	7
4.8 Possible facilitation measures by wildlife managers to make the media products balanced:	7
5. Forest-Media Cooperation: measures to be implemented by both sectors	8
5.1 Ethical and relevant considerations	8
5.2 Sensationalism aggravates HWC: How to ensure that sensationalism is avoided	8
5.3 Specific communication tools to be used for effective Media engagement	9
6. Media engagement during HWC related Emergency situations	10
6.1 Engaging with media professionals in an HWC related crisis situation	10
6.2 Planning for public outreach in times of crisis	10
6.3 General coordination between forest department and media during emergency situations	11
7. Use of learnings from the guidelines to further strengthen the practices on HWC Mitigation communication in India	12
8. Process of development, pilot testing of these guidelines and consultation process:	12
9. Monitoring and Evaluation of Guidelines	12
Annex I	13
National Technical Group (NTG)	13
Working Group on Pilot Implementation of Guidelines and HWC-NAP	13
Author Group for developing the guidelines on forest-media cooperation	13

1. ABOUT THE GUIDELINES

1.1 PURPOSE, APPROACH AND SCOPE

- Realizing the significance of effective and clear communication on the issue of human-wildlife conflict (HWC) mitigation, appreciating the significant role that media plays, and recognizing the need for cooperation between forest and media sectors, these guidelines aim to facilitate a common understanding of human-wildlife conflict mitigation communication and reporting in a holistic manner.
- This holistic approach entails not only media persons covering the emergency situations arising due to HWC, but also covering the approaches and measures to address the drivers and pressures that lead to HWC, establishment and management of prevention methods, and measures to reduce the impact of HWC on humans and wildlife, in their media products.
- The guidelines provide advise on the development, assessment, customization and evaluation of instruments and processes that ensure effective cooperation between forest and media sectors.
- The guidelines serve both the forest sector personnel and media sector personnel, with dedicated sections for each stakeholder. These guidelines can be used by the Forest Department in not only planning all engagements with the media but also for implementing capacity development measures related to media and communication for response teams and other forest personnel. These guidelines can be used by all media houses, editors and reporters, other professionals such as filmmakers, bloggers, freelancers, stringers, and others whenever they are engaged in communicating on HWC mitigation in India.
- The following guidelines are to provide guidance on selected species: guidelines for mitigating human–Elephant, –Leopard, –Gaur, –Snake, –Crocodile, –Wild Pig, –Bear, –Blue Bull, –Rhesus Macaque, and –Blackbuck conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation; Crowd Management in Human–Wildlife Conflict Related Situations; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human—Wildlife Conflict Situations: Taking a One Health Approach.
- Taking a capacity development approach, the guidelines facilitate the implementation through provision of Implementer’s Toolkit, which includes Operating Procedures (OPs), formats, checklists, and other field implementation aids..

1.2 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

India has multiple legislations, rules and guidelines for news media and related organizations. The print media too has its own model code of ethics with the objectives of not only safeguarding freedom of the press but also upholding the standards of editorial leadership of newspapers and magazines.

With the changing nature of journalism and emerging social media, the following existing policies and guidelines can help media personnel to self-regulate, while at the same time help the forest sector personnel to facilitate the process:

- Ministry of Information and Broadcasting (MIB) has relevant rules and Acts listed on their website for the media.
- The News Broadcasters Association (NBA)¹ has formulated the News Broadcasting Standards Authority (NBSA)² under MIB listing Code of Ethics and Broadcasting Standards and News Broadcasting Standards Regulation³ for news organizations to follow.
- Self-regulatory mechanisms regarding monitoring content, violation, telecast/broadcast on private TV channels are available, where complaints can be lodged by the public with Broadcasting Content Complaints Council (BCCC) regarding non-news and entertainment channels.
- The Press Council of India acts as a self-regulatory body to check malpractices in journalism and to maintain ethics in the profession. The Press Council Act, 1978⁴ has a section listing journalistic norms, and another one for registering complaints through email, where any person can lodge a complaint against a newspaper for breach of ethics and journalistic propriety and taste.
- The Department of Electronics and Information Technology, Ministry of Communications & Information Technology has a ‘Framework and Guidelines for Use of Social Media for Government Organizations’.
- Under the overall framework of the Wildlife (Protection) Act, 1972 (WPA), National Tiger Conservation Authority (NTCA) developed guidelines under which it is advised that an authorized spokesperson of the Forest Department, should periodically update the media (if required) to prevent dissemination of distorted information relating to the HWC operation/incidents, as sensationalization or distorted information can lead to further damage.

1.3 INSTITUTIONAL MECHANISM FOR IMPLEMENTING THE GUIDELINES

- The institutional mechanism outlined in HWC-NAP will be followed for implementing these guidelines.

1 News Broadcasters Association (NBA): <http://www.nbanewdelhi.com/>

2 News Broadcasting Standards Authority (NBSA): <https://www.ibfindia.com/news-broadcasting-standards-authority-nbsa>

3 Code of Ethics and Broadcasting Standards: <http://www.nbanewdelhi.com/code-of-ethics-and-broadcasting-standards>

4 Press Council of Act 1978: <https://legislative.gov.in/sites/default/files/A1978-37.pdf>

2. CONTEXT AND BACKGROUND

- The National Human-Wildlife Conflict Mitigation Strategy and Action Plan of India (HWC-NAP)⁵ highlights the role of media as a key stakeholder that can play a significant role in taking the desired message on HWC mitigation to the public. It further states that even though over the last decade, there has been a shift to issue-oriented media coverage, the media largely covers HWC only when an incident occurs. Constructive dialogue between wildlife managers and media professionals, agreement on guidelines, and identification of anchoring points for engaging media as partners in HWC mitigation, would be a priority.
- The media can play an important role in HWC mitigation, as it not only reports on the conflict but also creates awareness of what is the holistic approach to HWC mitigation, what is already being done and what more needs to be done, if provided with the relevant information.
- Media can highlight how wildlife and humans can co-exist with mutual benefits, and how conservation interventions are crucial for maintaining a healthy ecosystem and resulting ecosystem services that are the foundation of livelihoods and overall well-being of humans.
- Currently, while reporting and communicating on wildlife, media largely focuses on current crises events deemed ‘news-worthy’ by them, such as emergency situations arising due to the conflict between humans and wild animals. This, sometimes, induces the public to develop negative sentiments or opinions towards wildlife. With its wide reach, the media can help create a positive attitude towards the issue, and help stakeholders collectively arrive at sustainable and holistic solutions for HWC mitigation.
- At present, most of the good practices in forest-media cooperation on HWC mitigation largely exist due to individual efforts. To ensure that the forest-media cooperation is institutionalized, a systematic strategy for engagement is required.
- These guidelines intend to facilitate a systematic engagement between media and the forest sector, in terms of dialogue and joint capacity development measures at the institution level, subsequently working towards a common goal of harmonious coexistence between humans and wildlife in the country.

5 HWC-NAP <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3. FOREST-MEDIA COOPERATION: MEASURES TO BE IMPLEMENTED BY MEDIA SECTOR

3.1 OVERALL MEASURES

- Media can play a key role in raising awareness on wildlife issues. It can influence and shape the perceptions and opinions of the public. Stories, news, and information about the wildlife living in natural and human-dominated landscapes, or even wild animals that have adapted to living near urban areas, are widely read in newspapers, and also watched with keen interest when reported by electronic media. The impact of news coverage is magnified to a greater degree in the case of highly sensitive HWC scenarios. As a reaction, the public gets polarized, both in the online world and at the community level, over ‘human versus wildlife’.
- Media houses and media persons are expected to ensure fact-based reporting to avoid bringing out stories that either misrepresent, misinform, or sensationalize the situation. When media personnel gather information for their media products, they should ensure that the information source is credible. They may need to crosscheck all the facts and take comments and inputs from spokespersons of respective forest department and other stakeholders involved in the incident while reporting on the subject. This is crucial since stories on wildlife start trending in no time due to very high interest and viewership/readership.
- To ensure the high quality of media products, media persons should engage with the forest officers, researchers, and field practitioners, not only for a regular flow of stories but also to develop media products that take a holistic approach.
- Electronic media can avoid sensationalism by using balanced text, background and headline styles while reporting on HWC, to ensure that the news does not accentuate the fear of wildlife among the local public as that may result in heightened risk perceptions eventually leading to antagonism and less tolerance towards wildlife.
- The challenges of HWC mitigation in each landscape are different, owing to the landscape structure, socio-economic scenario, development scenario, history of wildlife conflict/conservation, and overall

threat perceptions of people. The media personnel may like to see this difference and communicate accordingly, after taking necessary input from the forest department personnel and other experts.

3.2 ADDRESSING SPECIFIC CHALLENGES THAT THE FOREST OFFICERS FACE IN ENGAGING WITH MEDIA ON HWC ISSUES:

- The forest officers find that media coverage is usually reduced when the escalation of a conflict situation was successfully averted by the forest department using effective mitigation measures. But if the same had failed and the situation had worsened, it would have hit the headlines. This is largely because news is all about something ‘exciting’ happening. This is a challenge that has to be met with effective communication from media to ensure effective and holistic coverage of not only HWC related emergency situations but also the overall picture of HWC mitigation in the landscape.
- Sometimes, media reports place the entire blame of an HWC incidence on wild animals, rather than explaining the underlying drivers and pressures that may have caused the emergency situation. This leads to widespread negative perception against the species concerned. This could lead not only to retaliatory killings, but also reduced public support for the overall wildlife conservation agenda. Another challenge is that in the absence such holistic media coverage, the underlying causes of HWC do not get the desired attention and remain unsolved. Media may take the opportunity to present the HWC situation in a holistic way by focusing on the causes of HWC in the landscape, thus contributing to addressing HWC in a systematic manner.
- Media personnel can use the opportunity to highlight the HWC mitigation measures being implemented/ being planned by the Forest Department and/or other agencies to address the situation, and also disseminate the information on ‘Dos and Don’ts’ for the public to prevent accidental encounters between humans and wildlife.



Media should report on Human-Wildlife Conflict Mitigation, and not only on Human-Wildlife Conflict



- Media organizations may make efforts to use the opportunities to get their personnel trained on HWC mitigation to facilitate them in communicating effectively and holistically on this complex issue.
- Media persons, especially photo-videographers, reporting on HWC-related emergency situations may work as partners in addressing HWC mitigation by adhering to the field protocol set out by the forest department for such situations, as sometimes it may not be advisable for them to go closer to the HWC incidence site, for their own safety or for the safety of the wildlife animal.

3.3 ROLE OF FILMMAKERS AND PHOTOGRAPHERS IN CONTRIBUTING TO LONG-TERM EFFORTS ON HWC MITIGATION:

Both filmmakers and photographers play a significant role in disseminating information on wildlife and conservation issues. The medium they use to tell stories is very powerful and can create a lasting impression. Visuals have more impact than words, and when it comes to wildlife, films and photographs help people see the beauty of nature up close, from the comfort of their homes, and thus evoking their love and passion for nature.

- Filmmakers and photographers may follow an ethical code of not sensationalizing issues related to HWC, and ensure that they take a holistic and balanced approach while presenting the central theme of their films/ products. They can also take the opportunity to highlight the importance of HWC mitigation in conservation, and why wildlife conservation is so vital to the ecosystem and overall well-being of humans.
- When a rescue operation is being conducted, forest officials are focused on completing operations seamlessly, without any harm to the animals or the humans around. Sometimes, the situation is extremely complex as animal behaviour and resulting HWC situations are not easy to predict. In such situations, while officials are working on something as complicated as this, it is imperative that filmmakers and photographers stay away at a reasonable distance from a wild animal, while documenting the HWC mitigation operations. This is not only to keep themselves safe but also to not agitate or further frighten the animal.
- Credit should be duly given to the forest department, in all such media products, to build trust and relationships for the future.

3.4 OCCUPATIONAL SAFETY AND HEALTH, ETHICAL ISSUES AND OTHER CONSIDERATIONS:

- There is a growing trend of people venturing too close to a wild animal for photographs, even in a conflict situation, which can be a grave danger to the person taking the selfie as the wild animal can charge on being provoked, to defend itself. Media personnel should avoid engaging in acts like this for their own safety and well-being.
- Media personnel should get themselves informed on the occupational health and safety aspects, concept of zoonotic disease prevention and the overall concept of One Health⁶. This will help them getting better prepared for any possibility of zoonotic diseases, when working closely with wild/ captive animals, and take all necessary precautions such as wearing masks, sanitization etc.
- The sensitive information on animal locations, movement and occurrence can be used by poachers to trap and poach wild animals, especially high-value species. Therefore, it is advised to not disclose the detailed location information to the general public. This can be done by switching off geo-tagging options on phones when clicking photos, or to not pin the exact location while sharing on social media.

3.5 SPECIFIC COMMUNICATION TOOLS TO BE USED BY MEDIA FOR EFFECTIVE ENGAGEMENT WITH WILDLIFE MANAGERS

- Media professionals may communicate regularly with the forest officers via meetings, and by using various messaging, social media and microblogging applications. Messaging groups may be used by the media personnel and forest officers to share any news on an impending/ongoing HWC-related emergency situation with each other, and also to alert the local community.
- Media houses may write occasional editorials on HWC mitigation and also be helped in the process, with background material, so that the editorial items are accurate in their analysis.
- Media personnel may make efforts to participate in trainings and other capacity development measures to develop a common understanding of the holistic approach to HWC mitigation.

⁶ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

4. FOREST-MEDIA COOPERATION: MEASURES TO BE IMPLEMENTED BY FOREST SECTOR

4.1 OVERALL MEASURES

The best instrument to create awareness on nature and wildlife conservation issues- including HWC mitigation, among media professionals, is to engage with the media on a regular basis. Having a large reach, the media can help sensitize the general public to the complicated issues of conservation, in very simple language.

- However, as media professionals are not wildlife specialists, it will be useful for the forest officers to constantly engage with them, to ensure that the media reporting is accurate, and both forest and media have the same perspective on the issue at hand.

4.2 MEASURES TO ENSURE DISSEMINATION OF CORRECT INFORMATION AND BUILD RELATIONSHIPS WITH MEDIA PROFESSIONALS

- Disseminating the right information to the media is of utmost importance, to avoid biased reports and inaccurate facts and analysis. Care may be taken by the forest department in providing accurate figures and statistics to the media, on a regular basis and not just during a crisis, to ensure fact-based reporting.
- The forest officials may identify media persons (local as well as national level) from all the media platforms, who report on conservation and environmental issues for such regular interactions. The forest officials may make themselves available for comments, responses and sharing key visuals and other information with the media personnel for a particular news/story, to facilitate the media personnel in developing a clear perspective on a particular incidence and subsequently developing media products based on facts in a sensitive manner.
- It may be useful for the forest officers to facilitate suitable media personnel in identifying relevant stories on HWC mitigation in their area/landscape. This may serve as an important trust-building exercise that may serve both forest officials and the media personnel during an emergency situation.

- Photographs and video footage are an important element in story-telling and attract much more views than write-ups. Therefore, the forest officers may provide interesting and relevant visuals from time to time, within the scope of the existing legal regime and advisories, depending on the species involved, to help media use these as key elements to supplement their media stories and increase viewership/readership.

4.3 FIELD VISITS TO FACILITATE AUTHENTIC REPORTS

It is very important that media personnel visit the actual HWC incidence sites and the sites where HWC mitigation measures are being implemented, while developing their media stories. This will give them a better insight into the drivers, pressures, state, impacts and current responses with regard to the HWC situation in the area.

- The forest personnel may plan regular field visits of the media personnel at HWC hotspots, possibly on special days such as World Environment Day, International Forest Day, Wildlife Week, Global Tiger Day, Elephant Day, World Biodiversity Day etc., to give out specific information related to the day/ week and highlight HWC mitigation measures that are being implemented in the area.
- Special interactions and field visits may be planned by the forest personnel for the media personnel to facilitate them in understanding a specific local complex HWC issue and developing a clear perspective on the issue.

4.4 NODAL PERSON FROM FOREST DEPARTMENT

- When there is an ongoing operation to capture an animal in a conflict situation, media persons may reach the site and attempt to engage with the staff of the forest department. To facilitate such engagement in an efficient and smooth manner, the forest department may identify a nodal person to interact with the media, who is prepared with the answers to the expected questions. This may ensure that rumours or incorrect information is not reported by the media personnel.

- Some news reports may carry all the factual information, but would nevertheless use a sensational headline, i.e., calling the animal ‘maneater’, ‘rogue’, or using terminology such as ‘animal attack’ etc. Therefore, the forest personnel may actively discourage the media personnel from using such terms and phrases, and also be careful to not use such terms themselves, which project the wild animal as a culprit and may further accentuate the negative and retaliatory sentiments among the human beings.
- A Public Relations (PR) wing may help the state forest department focus on regular communications with both the media and local community, on HWC mitigation. The PR Wing may also implement awareness and sensitization measures for the media personnel on developing and implementing holistic HWC mitigation measures.

4.5 ADDRESSING THE CHALLENGES, THE MEDIA ENCOUNTERS DURING HWC COMMUNICATION AND REPORTING

Getting information at the right time is extremely crucial for media personnel. It is their job to break stories. Stories are also now told via multiple platforms be it on mobile apps, web portals, television and in print. In such times, if the media personnel do get timely updates from the forest personnel, they may end up giving speculative information in their stories.

- The forest personnel may use appropriate platforms and applications to share timely updates with the media personnel to facilitate fact-based communication.
- A Press Release may be issued as early as possible, not only to make it easy for media coverage, but also to avoid any wrong information getting into media stories.
- Efforts may be made to release any major information through a public press conference, which gives an opportunity for hosting all media persons equally. Also, if a press conference is not possible, it may be useful to send a common press release across to the media or make the same public.
- The forest personnel may explain everything in detail, while keeping it simple with the explanations and avoiding technical details, to the media personnel, so that there are no errors in reporting.

4.6 DYNAMICS OF REGIONAL MEDIA

The local media personnel, including independent reporters and columnists are the first to reach the scene of an HWC incidence, as well as to cover an HWC mitigation measures, and it is their story, pictures and videos that are later used by the state and national media agencies.

- The forest personnel may take special care to provide detailed information in simple language and with all facts to such regional and local media personnel.

4.7 POSSIBLE FACILITATION MEASURES BY THE FOREST PERSONNEL TO MAKE THE MEDIA PRODUCTS BALANCED

- It might be a good idea to develop a media strategy to ensure effective forest-media cooperation in each state, if possible.
- Regularly interacting with media personnel may help in developing common understanding on the holistic approach to HWC mitigation. Regular interaction may also prevent rumours or misinformation from becoming news. This also ensures that the viewpoint of the forest department would always be carried, clearing the fog around certain issues.
- Forest officials may occasionally suggest story ideas to media personnel as the latter are not familiar with what is happening in the HWC mitigation front. Media personnel may also be facilitated to cover specific developments or decisions relevant to HWC mitigation.
- It may be useful to organize joint trainings for forest officials and media personnel, to develop a common understanding of HWC issues in the area, agree on the communication channels, and knowledge and experience sharing on HWC issues using participatory training methods.
- Media interns may be engaged by the forest department to document vital information and databases.
- If they do not wish to be quoted, forest officials should specifically say so to media persons, while being interviewed.

5. FOREST-MEDIA COOPERATION: MEASURES TO BE IMPLEMENTED BY BOTH ACTORS

5.1 ETHICAL AND RELEVANT CONSIDERATIONS

- Information on locations of wild animals is deemed highly sensitive. Such information on animal location, movement and occurrence can be used by poachers especially in cases of high-value animals to engage in trapping and taking away these animals (dead or alive) into the wildlife trade. Therefore, it is advised to use discretion while disclosing the information to the media.
- Display of wild animals is illegal under WPA 1972, and as such photography with a hunted (captured) animal can be interpreted as a display, under the law.
- Animal welfare, cultural and religious concerns should be respected while documenting HWC issues.

5.2 SENSATIONALISM AGGRAVATES HWC: HOW TO ENSURE THAT SENSATIONALISM IS AVOIDED

With social media and instant messaging applications turning into news media, the spread and frequency of news, including fake news, is exponentially increasing. With fake news having the potential to spread fast with a touch of a finger, it is extremely important for media personnel to ensure that their source of information is credible and verified, to facilitate them in counteracting fake news as soon as possible and arrest any unwanted damage. Here are the following ways, in which media personnel and forest officials can address the issues of sensationalism and fake News:

- Steps to be taken by the forest officials:
 - If a fake story goes viral due to some reason, steps may be taken to report to the Press Council of India, the Press Information Bureau, or cyber authorities that it was a fake story, and then present what are the right facts so that the spread can be blocked.
 - All fake or doctored news should be handled by the designated media spokesperson. A press release with the correct(ed) information, and narrative with corresponding photos and videos may be issued, substantiating the correction.
- The forest officials may contact the media personnel who may have used incorrect information in their media story and, after convincing the latter, request her/him to publish a corrected version of story or publish a rejoinder.
- If no action is taken by the concerned journalist, then the wildlife manager can write to his/her superior or the editor of the media house. If that also yields no result, and the news continues to be carried causing damage, the Forest Department can file an online complaint with either the Press Council of India, or the Broadcasting Content Complaints Council (BCCC) if the fake news plays on television.
- Meanwhile, the forest department may also share the correct information and narrative with corresponding pictures with other media personnel, and encourage them to publish a counter-narrative that discredits the fake news
- Under the new Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021 (the “IT Rules 2021”), a grievance can be raised in case any patently false or misleading information is published by a user on a social media platform.
- The post or article can be reported to the website or the application (as the case may be) by filing a grievance with their Resident Grievance Officer (RGO). The contact details of the RGO and the mechanism for filing a grievance are to be made publicly available by the social media intermediary. Under the IT Rules, 2021, the RGO has to dispose of the grievance in a time-bound manner, i.e., within 15 days from its receipt.
- Further, the social media accounts of the forest department may also be used to discredit the fake news or doctored content, and while at the same time sharing the correct information and narrative of the incident.
- The media personnel may use fake news detection tools and software analytic tools to detect the Fake story.

- Media persons may check with responsible spokespersons of relevant authorities what the real news is and try and ascertain where the fake story came from.
- The media personnel may check every fact in the story by talking to responsible forest officials and ensure that they have their version of the story.

5.3 SPECIFIC COMMUNICATION TOOLS TO BE USED FOR EFFECTIVE MEDIA ENGAGEMENT

- Regular interaction with Media: Regular interaction will provide opportunities to employ the several above-mentioned recommendations.
- Press conference: Holding a press conference to announce important information pertaining to occurrences, plans, achievements, research findings, and implementation of programs and so on may help in getting better coverage. Press conferences also serve as additional opportunities to interact with media persons.
- Press Release: It is not always possible to hold press conferences, especially during times of crisis or urgency and so a press release may be issued. It is best to keep it short and in simple and clear language.

- Active engagement via social networking sites
- In case of a crisis situation, or when responding to false information, different social media channels may be used to disseminate correct news.
- Workshops: Well planned and periodic media workshops using a participatory approach
- Effective media coordination during a crisis situation.
- The forest official may promote well-written and balanced HWC mitigation stories on social networking sites.
- A video and photo library may be built, to facilitate access of multimedia to media professionals so that stories could be better presented.
- Besides social media channels, the forest department may have an active and regularly updated official website.
- Publication houses may write occasional editorials on HWC and also be helped in the process, with background material, so that the editorial content is accurate in its analysis.
- Training for frontline staff, managers, and senior decision-makers may be organized on issues relevant to engaging with media on HWC

6. MEDIA ENGAGEMENT DURING HWC RELATED EMERGENCY SITUATIONS

- During an HWC-related emergency situation, the media is bound to be around, to capture the news as it happens. To get to the action, media persons may try and get as close to the epicenter as possible. This could very well hinder the HWC mitigation operations. To ensure that the conflict situation is handled carefully, keeping both humans and animals' safety in mind, following indicative actions may be beneficial:

6.1 ENGAGING WITH MEDIA PROFESSIONALS IN AN HWC RELATED CRISIS SITUATION

- In a crisis situation, it is advisable for the forest officials to not avoid the media. Do not say something like 'No Comments' as it may be misinterpreted or give the impression that there is something to hide. Giving straight and clear answers to media questions is a good option while aggressive responses can be avoided.
- Dedicated forest officials trained in media engagement may engage with media persons enabling other members of the team to deal with the crisis situation. A good practice is also to quickly share a clearly written, crisp media release, as soon as possible.
- In the absence of a designated spokesperson, media briefings may be addressed either by the senior-most member of the department, or by anyone with regular interactions with the media. If the briefing is happening after the situation has been contained, it may be useful to explain the entire operation in detail, highlighting the efforts that were taken to keep animals and humans safe.
- It's best to try and provide opportunities for photographers to get visuals, or in some cases, permit forest staff to shoot images and videos and later share it with media persons.
- If any media personnel runs a story that is not true to what happened during an HWC incident, or is found to be misleading, then the wildlife manager should take immediate steps, in line with the guidance provided in section 5.2 in these guidelines.

6.2 PLANNING FOR PUBLIC OUTREACH IN TIMES OF CRISIS

The forest officials may anticipate the questions that the media might ask. The media will also ask the same questions that the public wants answered, as that is what they want to relay to the readers. Primarily, they will want to know if any danger to human life persists, what is being done to secure their safety, when and what *ex gratia* is going to be paid to those affected, and how the conflict is going to be finally resolved. While they will want to pin responsibility or give credit, depending on the outcome, they will also want to look at government measures and policy. They will want statistics and figures to beef up their news story.

- It may be effective to use multiple media outlets – print, TV, Radio/ FM, online, social media to broadcast messages, asking the public not to panic, not to leave the safety of their homes and come out, or attempt to harm a wild animal-in-conflict during an HWC situation.
- Forest department staff at HWC hotspots and at other locations where regular media engagement is envisaged, may be coached to direct all questions and queries from the media to the designated spokesperson, when available.
- It is always a wonderful idea to develop a decision chart on who will do what in a crisis, which includes how the media will be briefed. All the personnel in the forest department may be on the same page and not give out contradicting narratives of the incidence.
- If there is a concrete visible action on the ground that demonstrates that the crisis is being actively and efficiently handled, it may be communicated to the media, as this could help people know what is being done and help in the public perception of the forest department.

6.3 GENERAL COORDINATION BETWEEN FOREST DEPARTMENT AND MEDIA DURING EMERGENCY SITUATIONS

- During an HWC related emergency situation, the Forest Department may involve and seek help from local press clubs, press associations and similar such bodies to ensure that the media persons do

not take undue risks to themselves. Such local media volunteers can convince media persons to operate in such a way that the lives of other humans are not put to risk, and also by cautioning onlookers to stay away from the conflict zone.

- A designated forest official may give regular updates to the media about the ongoing operation, preferably on an hourly basis, so that accurate information reaches the general public. In locations where internet coverage is adequate, a useful practice may be to post live updates about such information and updates on social networking sites. This way, media persons can use the information to supplement their stories and need not wait for official comments.

- The Forest Department, through training sessions, may instil a sense of trust amongst media persons assuring them they would have access to all relevant information, videos and even photographs with the forest department, and that these would be shared with the media persons in a timely fashion.
- If it is not safe at the scene of conflict for media persons to move around, they should be clearly instructed by the forest department to stay at a safe distance or may be shifted to a safer place.

7. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN THE INSTITUTIONAL AND POLICY FRAMEWORK RELATED TO HLC MITIGATION IN INDIA

The guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback coming from the implementation of these guidelines.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for fine-tuning these measures and for understanding the capacity

needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further reviewing the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP. This, combined with a centralised system of media reporting related data collection and analysis will facilitate learning for fine-tuning future interventions for forest-media cooperation.

8. PROCESS OF DEVELOPMENT, PILOT-TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives from media, Government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology.⁷ The experts had different roles in the drafting and editing process, viz., Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and independent wildlife and policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on

Pilot

- Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.
- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India and media institutions to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, and media experts, the draft of the guidelines was revised.
- A Committee was constituted by MoEFCC in December 2022, consisting of officials from MoEFCC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

9. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years from

2023 onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- Detailed mechanism, templates and guidance used for collating information and feedback on the use of these guidelines may be developed.

⁷ Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEX I

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Dr. Neeraj Khara/GIZ



Ministry of Environment, Forest and Climate Change
Government of India
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National Centre for Disease Control



Government of India



Ministry of Environment,
Forest and Climate Change,
Government of India

Guidelines for Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation

Taking a Harmonious Coexistence Approach



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Ministry of Environment, Forest and Climate Change



National Centre for Disease Control



Government of India



Ministry of Environment,
Forest and Climate Change,
Government of India

Guidelines for Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation

Taking a Harmonious Coexistence Approach

Abbreviations

ANM	Auxiliary nurse midwife	IFS	Indian Forest Service
ASHA	Accredited social health activist	IUCN	International Union for Conservation of Nature
AWW	Anganwadi worker	JFM	Joint forest management
BMZ	German Federal Ministry for Economic Cooperation and Development	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CPR	Cardiopulmonary resuscitation	MoHFW	Ministry of Health & Family Welfare
CCTV	Closed-circuit television	NCDC	National Centre for Disease Control
CWLW	Chief Wildlife Warden	NDRF	National Disaster Response Force
CZA	Central Zoo Authority	NGO	Non-governmental organisation
DBT	Direct benefit transfer	NTCA	National Tiger Conservation Authority
DFO	Divisional Forest Officer	NTG	National Technical Group
DLCC	District-Level Coordination Committee	NWAP	National Wildlife Action Plan
EDC	Eco-development Committee	OPs	Operating procedures
EIA	Environmental impact assessment	PA	Protected area
EWRR	Early Warning and Rapid Response	PCCF	Principal Chief Conservator of Forest
GIS	Geographical information system	PPE	Personal protective equipment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PRT	Primary Response Team
GoI	Government of India	RFID	Radio frequency identification
HOFF	Head of Forest Force (in a state)	RRT	Rapid Response Team
HSC	Human–snake conflict	SDRF	State Disaster Response Force
HWC	Human–wildlife conflict	SFD	State forest department
HWC–MAP	Human–Wildlife Conflict Management Action Plan	SHG	Self-help group
HWC–NAP	National Human–Wildlife Conflict Mitigation Strategy and Action Plan	SLCC	State-Level Coordination Committee
HWC–SAP	State-Level HWC Mitigation Strategy and Action Plan	SOPs	Standard operating procedures
IDSP	Integrated Disease Surveillance Programme	STG	Standard Treatment Guidelines
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About the Guidelines	6
1.1. The overall context	6
1.2. Purpose and scope	6
1.3. Approach	7
1.4. Legal and policy framework for implementing the guidelines	7
1.5. Institutional Mechanism for implementing the guidelines	7
2. Context and Situation	8
3. Principal Elements of OHS Guidelines	9
3.1. Hazard and Risk Assessment	9
3.2. Personal Hygiene	9
3.3. Veterinary facility for treatment of injured animals	9
3.4. Personal Protection	9
3.5. Medical Evaluation and Preventive Medicine for Personnel	9
3.6. Personnel Training	10
3.7. Record Keeping	10
4. Occupational Hazards and Risks	11
5. Prevention and Control Measures	12
Toolbox	13
Protocol 1: Standard Protocol on Personal Protective Equipment (PPE) for Human Health and Safety during HWC Mitigation Activities	15
Protocol 2: Protocol on Vaccination and Prophylactic Measures Prior to Embarking on HWC Activities	17
Protocol 3: Protocol on First Aid and CPR for Field Emergencies during HWC Mitigation Activities	19
Protocol 4: Protocol on Occupational Health and Safety during Pre-capture, Capture (Physical/Chemical) and Handling of Wild Animals	22
Protocol 5: Protocol for Firearm Use and Safety during HWC Mitigation Operations	24
Protocol 6: Protocol on Safe Usage and Storage of Drugs Used in HWC Mitigation	25
Protocol 7: Protocol on Response and First Aid for Accidental Exposure to Drugs Used in HWC Mitigation	27
Protocol 8: Standard Protocol for Human Health and Safety during Collection, Handling, Storage and Transport of Samples	30
Protocol 9: Protocol for Storage, Transport, Treatment and Disposal of Biomedical Waste Generated during HWC Mitigation Operations	32
Tool 1: Zoonotic diseases that can be transmitted from wild animals	36
Tool 2: Snake-bite management	38
Tool 3: List of government hospitals or clinics stocking rabies vaccine, anti-venom and antidotes	39
Tool 4: Line departments and other personnel involved in HWC	39
Tool 5: Infrastructure and equipment for managing HWC Mitigation measures	40
Tool 6: Types of biomedical and biohazard waste	44
Tool 7: Format (Form-1) for reporting an accidental spillage or exposure of biomedical or bio-hazard waste	45
Tool 8: Hazard and Risk Assessment sheet	46
Tool 9: Health assessment for persons involved in managing wild animals	47
6. Use of Learnings from the Guidelines to Further Strengthen Institutional and Policy Framework on Health Emergencies in HWC Situations in India	48
7. Process of Development and Pilot Testing of These Guidelines and the Consultation Process	48
8. Monitoring and Evaluation of Guidelines	48
ANNEXE 1	49
National Technical Group (NTG)	49
Working Group on Pilot Implementation of Guidelines & HWC-NAP	49
Author Group for Developing the Guidelines	49

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These “Guidelines for Occupational Health and Safety in the Context of Human–Wildlife Conflict Mitigation: Taking a One Health Approach” get the overall context from the Wild Life (Protection) Act, 1972, National Wildlife Action Plan (2017-31)¹ and National Human–Wildlife Conflict Mitigation Strategy and Action Plan (HWC-NAP) (2021-26)². HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines. This document takes into consideration the existing policies, guidelines, advisories and good practices issued by the Government of India and various state governments related to health emergencies and potential health risks arising out of human–wildlife conflict (HWC) situations.
- These guidelines take into consideration the advisory to deal with human–wildlife conflicts (MoEFCC, 2021), which seeks expedited inter-departmental coordinated and effective action by state governments/ UT administrations to prevent and deal with HWC and associated death/injury/permanent incapacitation of human beings/domestic animals/livestock due to attack by wild animals or loss of crops and property as well as accidental deaths of wild animals listed in schedules I–IV of the Wild Life (Protection) Act, 1972. These guidelines take into consideration the ‘National One Health Programme for Prevention and Control of Zoonotic Diseases’ being implemented by the Ministry of Health & Family Welfare (MoHFW), Government of India in coordination with the Ministry of Fisheries, Animal Husbandry and Dairying and the Ministry of Agriculture.
- The following guidelines are to provide guidance on selected species: guidelines for mitigating human–Leopard, –Elephant, –Gaur, –Snake, –Crocodile, –Wild Pig, –Bear, –Blue Bull, –Rhesus Macaque, and –Blackbuck conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human–Wildlife Conflict Mitigation; Crowd Management in Human–Wildlife Conflict Related Situations; and

Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2. PURPOSE AND SCOPE

- These guidelines aim to prevent and mitigate accidents, occupational injury, illness, exposure to threats to safety and other hazards faced by personnel associated with management of wild animals in conflict.
- These guidelines focus on developing a common understanding, among the key stakeholders, on the occupational health and safety issues associated with restraint/handling of wild animals, safety training programmes and hazard and risk assessment and provide knowledge of the medical evaluations, vaccinations or immunisations (tetanus, rabies, etc.) involved and the laws in place in India for ensuring occupational health and safety when managing wild animals-in-conflict.
- These guidelines serve as a basis for overall long-term planning and coordination of occupational health and safety measures at the national, state and division levels, taking a One Health approach³.
- In general, these guidelines apply to all stakeholders involved in managing wild animals in conflict, including but not limited to, various line departments (the police, the disaster management, rural development, irrigation, agriculture, animal husbandry, urban development, education and health departments, Panchayati Raj Institutions, the railways, municipalities, etc.). Sections in these guidelines are meant to be used by the state forest department and Rapid Response Teams responsible for long-term planning and execution of HWC mitigation plans and measures.
- The guidelines will be able to bring in more effectiveness and efficiency when they are fully integrated into the Division-Level HWC Management Action Plans (HWC-MAP) and State-Level HWC Mitigation Strategy and Action Plans (HWC-SAP) and into the implementation plans of the National One Health Programme for Prevention and Control of Zoonotic Diseases, being implemented by the Ministry of Health & Family Welfare (MoHFW).

¹ MoEF&CC (2017). National Wildlife Action Plan (2017-35)

² National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

³ One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

1.3. APPROACH

- The development and implementation of these guidelines is driven by a harmonious-coexistence approach⁴ to ensure that both humans and animals are protected from negative impacts of HWC.
- The development of these guidelines and the intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of the measures with key sectors and stakeholders at the national, state and local levels. While the overall planning and coordination of human–animal conflict mitigation operations will be the responsibility of the state forest department, all other concerned key departments and agencies participate in and support the operations and carry out their functional responsibilities in coordination with the forest department to implement these guidelines.
- These guidelines may be used in the field, with the help of the Implementer’s Toolkit, which provides detailed information, formats and checklists to be used for health emergencies.
- These guidelines may be provided to each forest range, RRT, PRT, district administration, police station at a HWC hotspot, hospital, district disaster management authority, panchayat and wildlife expert and to other key stakeholders as mentioned in these guidelines.
- The documents may be translated into the local language for the field teams. Specific elements such as checklists, especially those needed for emergency response situations, may be printed in large-size posters and placed prominently on the walls of the HWC Mitigation Hubs and in similar control rooms of other stakeholders such as the police, district administration, hospitals, accredited social health activists (ASHAs) and anganwadi workers (AWWs).

1.4. LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- These guidelines may be read in conjunction with the existing relevant legal and regulatory frameworks. Also, any change in the legal provisions would require revisiting the guidelines. Refer to the supplementary framework of the HWC-NAP for more details on the specific legal provisions for HWC mitigation.

1.5. INSTITUTIONAL MECHANISM FOR IMPLEMENTING THE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP may be followed for implementing these guidelines.
- Implementation of these guidelines will be anchored in each district at the District-Level Coordination Committee (DLCC), chaired by the respective District Collector, where the system of regular feedback and fine-tuning of the protocols and processes will be done to customise these to suit the local conditions.
- An effective coordination with the institutions responsible for implementing the National One Health Programme for Prevention and Control of Zoonotic Diseases and the National Rabies Control Programme⁵, being implemented by the Ministry of Health & Family Welfare (MoHFW), Government of India, may further strengthen the implementation feasibility of these guidelines.

⁴ ‘Harmonious coexistence’ is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human–wildlife interaction on humans or on their resources and on the wildlife or on its habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and that of humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

⁵ National Rabies Control Programme National Rabies Control Programme :: National Centre for Disease Control (NCDC)

2. CONTEXT AND SITUATION

Mitigating human-wildlife conflict (HWC) invariably includes tracking, capture, tranquilisation, restraint/handling of dangerous wild animals, using hazardous scheduled drugs and exposure to zoonotic diseases. These present unique risks and hazards that require specialised skills, education and awareness to prevent harm.

Wildlife managers, veterinarians, biologists and members of response teams face numerous and diverse hazards and risks classified as physical, biological, chemical, mental/psychological and allergic hazards of the profession and an increased risk of allergen-induced anaphylactic shock. In the context of HWC, a hazard is the inherent danger involved in the capture, tranquilisation and translocation of a wild animal in conflict. The risk is a measure of the likelihood of a drastic consequence of wild animal restraint/handling and the inherent hazards of such operations.

The potential hazards associated with human-wildlife conflict mitigation (types of hazard and their consequences) are the following:

Physical Hazards. Injuries due to unsafe mechanical and physical conditions due to inadequate equipment, vehicles and ancillary equipment, inadequate occupational hygiene, heat and hypothermia and injuries due to mechanical objects. Injuries due to kicks, scratches and bites are unavoidably associated with most animal contact. Working with equipment and ponderous animals and, such as metal cages can injure and stress muscles and joints. The potential for wet muddy areas in animal conflict situations increases the risks of slipping and falling.

Chemical Hazards. Exposure to drugs and chemicals used in field operations; secondary exposure through conflict mitigation strategies.

Biological Hazards. Exposure to disease-causing pathogens (Annexure 3.1) due to bites, ingestion, inhalation, mauling, stings and scratches, exposure to biological samples, etc.

Psychological and/or Physiological factors. stress, allergies, other pre-existing conditions, fatigue, anxiety, psychosomatic disorders, congenital heart defect (CHD), hypertension, locomotor disorders.

Retaliations from Key Stakeholders. In some cases, the political and local situations can be hazardous. The public, whom the response team is trying to help, may, by itself, be a potential risk. Unruly crowds can create a danger for all the people involved in HWC mitigation activities through unpredictable and irrational behaviour. The HWC team personnel may be aware of such human-related risk factors and take appropriate action, including co-option of law enforcement personnel in the response team.

Weather and Environmental Hazards. Weather conditions can also pose a risk, particularly in areas where the HWC mitigation team encounters extremes of temperature, rainfall and altitude or situations with flash floods, landslides or avalanches. The HWC team may thus be well prepared for the weather conditions as well as the terrain that may be encountered. Prevalent weather conditions may be assessed prior to attempting HWC mitigation operations, and the operation may be continued only if favourable conditions exist.

Firearms Safety- Personnel untrained in use and safe handling of firearms, or use of poorly maintained firearm equipment, can endanger the health and safety of personnel involved in HWC management operations.

Steps need to be taken to recognise and assess potential risks and hazards for the safety of the personnel and the wild animal involved in a conflict situation and to minimise the risks inherent to the capture, restraint and translocation of a wild animal in conflict.

Zoonotic diseases based on pathogenic organism

- Bacterial, Rickettsial and Chlamydia! diseases – Anthrax, Brucellosis, Leptospirosis
- Viral diseases – Rabies, Nipah virus infection, Influenza type A, Kyasanur forest disease (KFD), Viral hepatitis
- Fungal diseases – Aspergillosis, Cryptococcosis
- Parasitic diseases – Leishmaniasis, Toxoplasmosis, Trypanosomiasis

Zoonotic threats from different animal taxa

- Mammals – Rabies, Tuberculosis, Anthrax, Brucellosis, Nipah virus infection, Kyasanur forest disease (KFD), Crimean Congo Haemorrhagic Fever
- Avians – Psittacosis, Salmonellosis, Avian influenza
- Reptiles and Amphibians – Campylobacter, Salmonellosis
- Aquatic creatures – *Clostridium botulinum*, Listeriosis, Salmonellosis

3. PRINCIPAL ELEMENTS OF OHS GUIDELINES

The primary goal of an occupational health and safety programme is good coordination and teamwork amongst members, towards a common goal, preventing exposure and reducing the risk of occupational hazards, thereby contributing to the success of the HWC operations.

The following elements are essential components of an effective occupational health and safety programme.

3.1. HAZARD AND RISK ASSESSMENT

- Understanding potential hazards that are inherent to HWC management, such as likely injuries from handling animals, exposure to scheduled wildlife-restraint drugs, allergens or zoonoses; ascertaining the level of risk; and determining preventive and control measures required in different HWC situations.
- Team members participating in HWC mitigation may be assessed for their fitness on the basis of the following:
 - the extent and level of participation in occupational health and safety training programmes for dealing with wild animals
 - the susceptibility of the personnel
 - the past history of occupational illness or injury when dealing with conflict.
- Team members may complete the hazard and risk assessment checklist for personnel having contacts with diseased animals.

3.2. PERSONAL HYGIENE

- The team members may follow the hygiene protocol, which includes the following:
 - Maintaining personal cleanliness and hygiene
 - Use of suitable clothing, gloves, masks, head covers, coats, coveralls, shoe covers, etc. when dealing with wild animals
 - Follow the protocol, including hand-washing and changing clothes wherever necessary
 - Carrying out procedures so as to minimise risks of splashes, spills and generation of aerosols

3.3. VETERINARY FACILITY FOR TREATMENT OF INJURED ANIMALS

Personnel involved in medical management in veterinary hospitals or makeshift field hospitals may understand the chemical and biological dangers associated with the facility.

- Keep the facility clean and ensure that emergency safety devices (fire extinguishers, eye washes, etc.) are easily accessible and in working order.
- Ensure that all personnel wear protective clothing such as lab coats, a pair of overalls/dungarees, gloves and safety glasses.
- Do not eat, drink, smoke, store food and food utensils or apply cosmetics or lip balm when in the veterinary facility.
- Avoid wearing loose clothing, jewellery, shorts, open-toed shoes or sandals.
- While loading dart guns with chemicals and drugs, avoid spillovers and careless handling.
- Wash hands after handling infectious material and before leaving the facility. Hand sanitisers containing 70% alcohol may be used.
- Decontaminate all contaminated materials before disposal or reuse, and decontaminate surfaces after any bio-hazardous materials are spilt.
- Personnel must use special facilities and safety equipment as recommended and dispose of hazardous or contaminated waste according to the existing guidelines.

3.4. PERSONAL PROTECTION

- Obtain and use personal protective equipment (PPE), including clothing, shoes, shoe covers, gloves, arm protectors, masks, face shields, hearing protection equipment, respirators and any other items that may be needed for specific purposes.

3.5. MEDICAL EVALUATION AND PREVENTIVE MEDICINE FOR PERSONNEL

- Comply with required medical evaluations for high-risk positions and those with substantial contact with wild animals.
- Comply with the immunisation and vaccination requirements for personnel dealing with HWC.
- The public health institutions may consider pre-exposure vaccination of the healthcare workers handling the biomedical waste and the possibility of exposure to zoonotic diseases.

3.6. PERSONNEL TRAINING

The key element to a successful accident prevention programme relating to occupational safety and health is competency-based training in health and safety issues. The RRTs/PRTs are the first responders in any HWC emergency situation and may promptly act according to the roles and responsibilities assigned to each member and draw lessons from the training undergone for managing such situations.

- Competency-based training programmes may be planned and implemented in line with the Supplementary Framework to HWC-NAP on Establishment and Capacity Development of Response Teams⁶.
- In addition to the training programmes and measures suggested in the supplementary framework, the following specific measures may be implemented for enhanced effectiveness in ensuring OHS for the personnel engaged in HWC mitigation operations:
 - Training of officials in the use of these guidelines and tools
 - Bi-annual mock drills involving all personnel for reinforcing the learning through practice
 - Monthly or bi-monthly checks and cleaning of equipment
 - Regular meetings to promote safe work practices, issuing safety newsletters and electronic bulletin boards (can be helpful in dissemination of information)
 - The National One Health Programme for Prevention and Control of Zoonotic Diseases has developed IEC material for priority zoonotic diseases such as KFD, brucellosis, Nipah, CCHF, leptospirosis, rabies, anthrax etc. This IEC material⁷ may be used for training and awareness programmes.
 - Customised training modules for each staff category and development of specialised training modules according to their responsibilities
 - Wildlife managers and veterinary medical officers may receive specialised training apart from occupational health and safety in the following disciplines: basic concepts of wildlife biology; ecology; conservation; habitat ecology; population ecology; wildlife and population management; wildlife laws and jurisprudence; wildlife forensics and illegal trade; wildlife health;

wildlife capture, restraint and immobilisation; and human–wildlife interface issues.

- Medical doctors may be trained in providing care and treating HWC-related human emergencies and medical conditions, including administration of anti-venom, as well as antidotes to drugs used in HWC activities.
- Staff members handling biomedical waste (BMW) may be trained regularly in biomedical waste management.
- Personnel may learn general safety rules and safe operating procedures, learn about ergonomic hazards and be trained in specific protocols.
- All personnel may be aware of their specific roles and duties and the hazards associated with those duties (such as zoonoses, chemical hazards, physical hazards and allergies and handling waste material).
- Training programmes should provide personnel with information about the levels of risk associated with working with animals and personal health conditions.
- Make certain that personnel are proficient in implementing safety precautions.
- Posters and pictorial guides may be used for providing briefings about procedures.
- Periodic refresher training programmes on safety and health care may be conducted.

3.7. RECORD KEEPING

- Maintain records of the medical history, past accidents, exposure, injuries and pre-existing health conditions of all personnel.
- A monthly record of the biomedical waste generated may be maintained.
- Reference material available in a basic library of reference books and journals should be readily accessible.
- A computer with high-speed Internet access may be made available to the veterinarian in charge of the HWC team.
- Web resources and email contact with colleagues are invaluable sources of information in solving many intricate HWC operations.

⁶ Supplementary Framework to HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams, available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

⁷ IEC material on Zoonotic Disease developed by NCDC under the National One Health Programme for Prevention & Control of Zoonoses IEC Material on Zoonotic Disease :: National Centre for Disease Control (NCDC)

4. OCCUPATIONAL HAZARDS AND RISKS

- Personnel managing HWC meet many challenging situations that involve dangers and threats to their health, safety or personal well-being from the animals, the habitats, the human population and the interventions involved in the capture, tranquilisation and translocation of wild animals. Understanding the hazards associated with the operation is helpful in planning work and avoiding mishaps. Information from a hazard analysis will determine the appropriate use of standard precautions, personal protective equipment and workplace safety and health programmes to minimise or mitigate risks. A hazard analysis will provide inputs for preventing and eliminating hazards, reducing injuries and illnesses, reducing high compensation costs and increasing productivity.
- Review hazards regularly and repeat the analyses when the nature of the task changes or when an incident happens.
- The HWC mitigation team is grouped in the following according to the specific functions and duties and their vulnerability to the hazards.
 - The administration team (personnel manning administrative offices and control rooms) ensures compliance with protocols and maintenance of records. It coordinates the OHS programme and communication between different offices and individuals, serves as a contact place and information dissemination centre and maintains emergency contact. This team coordinates with animal rescue facilities and animal release sites and maintains an equipment list and a database of personnel training records.

The administrative personnel who do not have direct/substantial animal contact in their daily tasks and functions, but who may need to visit field operations in the course of their duty are placed in the low-risk category and may report any medical condition for which medical examination and treatment are required.
 - The wild animal tracking and surveillance team uses field craft to read animal signs and follow a wild animal in conflict. It communicates with other teams to capture and relocate an animal.

The wild animal tracking and surveillance team and the frontline HWC mitigation workers are very vulnerable to animal attacks (high risk) when tracking animals, and the injuries could take the form of bites, sprains, scratches and in extreme cases body disfigurement, bone fractures and deep, grievous injuries. Sometimes death results. Infectious agents in animal fluids and faeces can cause exposure to bacteria, fungi, parasites, protozoa, rickettsia, viruses and blood-borne pathogens,
- The veterinary team (veterinarians, paramedics, biologists, animal keepers) reaches the identified animal in conflict and restrains it (physically/chemically). The team places it in an appropriate cage/kraal and carries out treatment of the animal. If necessary, the team releases the animal in the wild.

The veterinary personnel who do have direct/substantial animal contact in their tasks and functions are vulnerable (high risk) to bites, sprains and scratches from animal handling, burns, skin irritation, inhalation and ingestion of chemical agents, zoonotic diseases acquired from animals and allergies from exposure to animal urine, contaminated litter, dander, hair, bacteria, fungi, parasites, protozoa, rickettsia, viruses and blood-borne pathogens.
- The logistics team (transport, communication, use and maintenance of equipment) provides communication support and various items equipment for physical and chemical restraint and maintaining crowd control.

The logistic team is also vulnerable (medium risk) to animal attacks and has direct/moderate animal contact in the course of its tasks and functions relating to capture of animals, placing them in cages/kraals and transporting them to rescue facilities and release locations. Members of this team are moderately prone to all the hazards faced by the veterinary team.
- All the team work may be carried out in tandem.

5. PREVENTION AND CONTROL MEASURES

The following measures may be implemented to avoid, reduce or eliminate exposure to hazards and risks.

- Avail services of veterinarians with knowledge and competency (biology of the species, wildlife-related zoonoses and use of different anaesthetic drugs) related to the capture, tranquilisation and translocation of different animal species.
- The animal handling during a rescue operation may follow the hygiene protocol, and the waste management may be in accordance with safe operating procedures.
- Ensure that all the field personnel are in good physical and mental condition, with preventive vaccination and other prophylactic measures taken prior to embarking on field operations.
- Team members may have basic first-aid and cardiopulmonary resuscitation (CPR) training to deal with potential health hazards that could arise during the capture or handling of animals.
- Personal protective equipment (gloves, uniforms, gowns, aprons, masks, hard hats, safety glasses, steel-toed boots, respirators, etc.) may be worn to avoid any injury/infection.
- Use equipment (barriers, trenches, traps, cages, nets, remote drug delivery systems, capture and transportation equipment, stretchers, tourniquets, etc.) that is well maintained for smooth performance. Follow the operating procedures, and only trained personnel may be authorised to use it during operations.
- Animal transportation is to be done using appropriate cages. Provide food and water and maintain a slow, constant speed to avoid any injury to the animal.
- Personnel may be familiar with standard emergency procedures (evacuation routes, emergency exits, emergency contact phone numbers) and coordinate with appropriate public health, veterinary, medical and emergency services (ambulance, fire, police) and administrative departments to handle emergencies and accidents.
- Some zoonotic diseases can be prevented by appropriate immunisation or vaccination; wearing gloves and protective clothing when handling species with zoonotic disease potential; participating in medical consultations and surveillance; and avoiding high-risk animals and situations.
- Follow strict protocols for handling and transporting animals and for collection and handling of samples. Use personal protection equipment (PPE), disinfect and decontaminate all equipment. Provide proper training in the use, handling, maintenance and disposal of the equipment, firearms, chemicals and drugs involved in the HWC operations. Follow the protocols of vaccination and prophylactic measures.
- Maintain the requisite permissions of the competent authority relating to the use of equipment, drugs, chemicals, infrastructure, vehicles, route permits, etc. that are required for dealing with accidents or emergencies.
- Keep adequate stocks of first-aid kits and anti-venom kits.
- Participate in training programmes relating to animal handling, personal hygiene, disinfectant use, basic first-aid and cardiopulmonary resuscitation (CPR), bio-hazardous waste management, equipment maintenance, use of safety devices, emergency procedures, reporting protocols of accidents and exposure to zoonotic agents and conducting hands-on experiential training programmes and mock drills.
- A hazard analysis lists the potential hazards associated with HWC mitigation and the protocols to be followed to reduce/eliminate the potential threats and risks. Biological-source hazards can be reduced by following a series of key steps:
 - When there are any suspicious animal deaths or multiple deaths, the carcass must be removed to a designated bio-safety necropsy facility instead of completing a necropsy in the field to avoid spreading infections. However, this may not be possible in the case of large mammals.
 - Samples may not be collected from live trapped animals to obtain genetic information for reference in areas where highly infectious zoonotic diseases are endemic.
 - For collecting samples from animals, use chemical restraint instead of physical restraint to avoid direct contact with animals and body fluids.
 - Store samples at approved and dedicated specimen storage locations according to the protocols.
 - Use standard equipment for remote delivery of injections and drawing blood samples.
 - Work in teams with assigned tasks and exercise greater vigilance when completing field necropsies.
 - Use PPE and appropriate equipment to prevent exposure to hazards.

TOOLBOX

Contents

Protocols

Protocol 1: Standard Protocol on Personal Protective Equipment (PPE) for Human Health and Safety during HWC Mitigation Activities

Protocol 2: Protocol on Vaccination and Prophylactic Measures Prior to Embarking on HWC Mitigation Activities

Protocol 3: Protocol on First-Aid and CPR for Field Emergencies during HWC Mitigation Activities

Protocol 4: Protocol on Occupational Health and Safety during Pre-capture, Capture, Handling, Care and Transportation of Wild Animals Involved in HWC Mitigation Activities

Protocol 5: Protocol on Safe Use, Storage, Transport and Handling of Firearms Used in HWC Mitigation Activities

Protocol 6: Protocol on Safe Usage and Storage of Drugs used to Capture Wild Animals during HWC Mitigation Activities

Protocol 7: Protocol on Response and First-Aid for Accidental Exposure to Drugs Used to Capture Wild Animals during HWC Mitigation Activities

Protocol 8: Standard Protocol for Human Health and Safety during Collection, Handling, Storage and Transport of Samples during HWC Mitigation Activities

Protocol 9: Protocol on the Storage, Transport, Treatment and Disposal of Biomedical Waste Generated During HWC Mitigation Operations

Tools

Tool 1 Zoonotic diseases transmissible from wild animals

Tool 2 Snake-bite management

Tool 3 List of government hospitals or clinics stocking rabies vaccine, anti-venom and antidotes

Tool 4 List of line departments and other personnel involved in HWC, with updated contact numbers and names (response teams to draw a flow chart on roles and responsibilities, on the basis of hierarchies of roles of each department/member, for their respective regions)

Tool 5 Infrastructure and equipment required for managing HWC activities

Tool 6 Infographic on types of biomedical and biohazard waste

Tool 7 Format (Form-1) for reporting in case of an accidental spillage or exposure of biomedical or bio-hazardous waste

Tool 8 Health and risk assessment sheet

Tool 9 Health assessment for persons involved in managing wild animals

Protocol 1:

Standard Protocol on Personal Protective Equipment (PPE) for Human Health and Safety during HWC Mitigation Activities

Understanding the potential hazards before any field intervention involving handling of animals (live or dead) is crucial for selecting the right PPE. This is determined by (a) risk assessment of the workplace, the task and the associated hazards (the kind of PPE adopted will depend on the kind of work involved, the danger of exposure to chemicals, drugs, bodily fluids, carcasses and other bio-hazardous material) and (b) reviewing Material Safety Data Sheets (MSDS) or other suitable resources regarding chemicals that may be used during the planned activities.

The following categories of appropriate PPE are to be used in the field, depending on the activity.

- 1. Eye and face protection.** Eye protection may be achieved by wearing protective eye-wear to prevent or reduce the risk of exposure. General safety glasses and impact-resistant safety glasses are sufficient for most animal handling in the field. They are especially important when chemical immobilisation or biological sample collection procedures are involved. However, it is crucial to wear full-face shield masks and N93 respirators during post-mortem examinations of carcasses, especially those found in areas where certain highly infectious zoonotic diseases such as anthrax, tuberculosis, Nipah virus infections and Kyasannur Forest Disease (KFD) are endemic.
- 2. Hand protection.** Gloves are only needed when an animal, animal tissue, drugs, chemicals or carcasses are directly handled. Gloves may be worn at all times when handling a live, or dead, animal. Selecting the right gloves depends upon the type of activity in which personnel are involved (thick leather gloves for handling and restraining animals, latex or nitrile gloves for all other purposes). The gloves do degrade over time and may be replaced if the shelf life has been exceeded. For biological sampling, sterile light latex, vinyl or nitrile gloves are preferable as they offer ease of movement and do not hinder the function of the hands and fingers. Gloves may be used in two layers to avoid contamination in case there is a breakage. When using caustic disinfectants for cleaning environmental surfaces, one can use heavy duty reusable latex or nitrile gloves. All gloves must be test-fitted to ensure proper fitting and coverage prior to use in the field. Improperly fitting gloves can lead to serious accidents and exposure to harmful chemicals or biological agents.
- 3. Body protection.** Cotton or cotton blend overalls are a must in the field when handling animals for any purpose. Aprons are occasionally used in instances where limited contamination is anticipated. For all other non-contact or negligible-hazard risks, regular clothing should suffice. All protective body covering should fit comfortably and fit snugly. Cotton and spun material gowns, overalls and aprons may be washed and reused or disposed. However, they should not be washed in the same equipment or area as used for household clothes. The degree of fluid resistance varies among these materials. This is why fluid-resistant clothing may be used if body fluid contamination is anticipated. Shoes may be covered with stretchable disposable booties to prevent contamination. The soles of the shoes may be disinfected before and after each procedure. When working with carcasses, especially animals suspected to have died of disease or ill-health, or carcasses in areas where highly infectious zoonotic diseases are endemic, Tyvek or other impermeable, biosafety recommended coveralls, face and head shields and boot covers may be used.
- 4. Respiratory protective equipment.** These are useful when there is potential for exposure to biological or chemical hazards as outlined in the SOP. Various respiratory kinds of protective equipment are available, and proper fitting and use are crucial for efficient protection. Surgical masks protect against fluid splashes and large droplets and do not require test-fitting. N95 respirators and other heavy-duty respirators (half-mask, full-face and respirator cartridges) may be used when potential bio-hazards are anticipated. The efficiency of these respirators is dependent on proper fitting. Therefore, test-fitting is a must before using them. They should fit snugly around the nose and eyes. An adequate number of masks should be available in the field to ensure that all personnel are protected at all times.

General do's and don'ts

- Work from clean to dirty.
- Limit your movement from one place to another to avoid contamination.
- Remove PPE carefully in the field and store or dispose of it in a bio-hazard bag.
- Change into clean clothes before you head out of the field.
- All used PPE should be sterilised properly in a place designated for disinfection of contaminated materials. Do not carry it home or to your office.
- Do not touch your face, PPE or other surfaces with soiled hands.
- The following disinfectants may be used for disinfection of surfaces and discarded material:
 - i) Borax
 - ii) 5% formalin
 - iii) Sodium hypochlorite (0.5%)
 - iv) 70% ethyl alcohol (for disinfecting instruments)
 - v) 5 % sodium carbonate
- Rubbing alcohol, 70% ethanol, quaternary ammonium compounds or other sanitisers should be used to disinfect and sanitise hands after all activities have been completed.

References

- Standard operating procedure #710- Personal Protective Equipment Requirements. 2018. Comparative Medicine & Animal Resources Centre. McGill University.
- Standard Operating Procedure: Managing Disease Risk in Wildlife Management. 2017. Department of Biodiversity, Conservation and Attractions. Government of Western Australia.
- Occupational Health: A Manual for Primary Health Care Workers. 2001. WHO Regional Office for the Eastern Mediterranean, Cairo.

Protocol 2:

Protocol on Vaccination and Prophylactic Measures Prior to Embarking on HWC Activities

Prior to embarking on any field procedures involving working with wild animals, it is recommended that the vaccination and prophylactic protocols be followed.

Remember that there might be additional vaccines or prophylaxis required, depending on the geographic area you are working in and the kind of disease or health threat arising from the wildlife present in that region. It is best to consult the local public health department to identify all potential vaccines and preventive medications required prior to working with wildlife in that region.

1. Vaccination (preventive and curative)

a. Anti-rabies vaccine. Pre-exposure vaccination includes four doses taken at 0, 7 and 21 or 28 days. Booster doses are given if the serological titres of virus neutralising antibodies decrease to below 0.5 IU/ml in serological screening conducted every two years after vaccination. The WHO now has new recommendations for post-exposure prophylaxis (PEP), which should be performed by a trained medical practitioner. It involves determining the category of exposure as explained in the following.

Category I: Touching or feeding animals, licks on intact skin

Category II: Nibbling of uncovered skin, minor scratches or abrasions without bleeding

Category III: Single or multiple trans-dermal bites or scratches, contamination of mucous membrane or broken skin with saliva from animal licks, exposure due to direct contact with bats

Individuals with WHO Category II or III exposure should receive PEP without delay. PEP consists of the following steps:

- All bite wounds and scratches should be attended to as soon as possible after the exposure. Thorough washing and flushing of the wound for approximately 15 minutes with soap or detergent and copious amounts of water is required.
- Where available, an iodine-containing, or similarly viricidal, topical preparation should be applied on the wound.
- RIG should be administered for severe Category III exposure. Wounds that require suturing should be sutured loosely, only after RIG infiltration into the wound.

- A series of rabies vaccine injections should be administered promptly after an exposure. These may include five doses at 0, 3, 7, 14 and 28 days after exposure. A tetanus toxoid should also be administered to prevent tetanus.

b. Anti-tetanus vaccine. Taken once every 10 years if already immunised with five or six doses as a child. If not, two doses, 21 days apart, followed by boosters every 10 years.

c. Hepatitis A and B vaccines. Currently these are advised for all adults in India. Administer a three-dose series of HepB to those persons not previously vaccinated. The second dose should be administered one month after the first dose. The third dose should be administered at least two months after the second dose (and at least four months after the first dose). If the combined hepatitis A-and-hepatitis B vaccine is used, administer three doses at 0, 1 and 6 months. Alternatively, a four-dose schedule, administered on days 0, 7, 21 to 30, followed by a booster dose at Month 12, may be used. Adult patients receiving haemodialysis or with other immunocompromised conditions should receive one dose of 40 µg/ml administered on a three-dose schedule or two doses of 20 µg/ml administered simultaneously on a four-dose schedule at 0, 1, 2 and 6 months.

Prophylactic medication

b. Anti-malarials. Malaria is a risk in most parts of India. Get an anti-malaria prescription if working in a malaria-prone region and follow the doctor's instructions for taking the pills.

c. Topical insecticides against ticks and mites

d. Anti-allergens. For those suffering from allergies to pollen, animal hair, etc.

2. Prevention and prophylaxis. Bugs (such as mosquitoes, ticks and fleas) can spread a number of diseases in India. Many of these diseases cannot be prevented with a vaccine or medicine. You can reduce your risk when working in wilderness areas or in areas with potential exposure to wildlife during HWC activities by taking the following steps to prevent bug bites:

- Cover exposed skin by wearing long-sleeved shirts, long pants and hats.
- Use mosquito-repellent clothing.
- Use an appropriate insect repellent.

- Use permethrin-treated clothing and gear (such as boots, pants, socks and tents). Do not use permethrin directly on skin.
- Check your entire body for ticks after any outdoor activity. Be sure to remove ticks properly.
- Use a bed net if the area where you are sleeping is open to the outdoors.
- For protection against ticks and mosquitoes, use a repellent that contains 20% or more DEET for protection that lasts up to several hours.
- Apply hydrocortisone cream or calamine lotion to reduce itching.

References

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- National Rabies Control Programme. National Guidelines on Rabies Prophylaxis. 2015. National Centre for Disease Control., Delhi. www.ncdc.gov.in
- Zoonotic Diseases of Public Health Importance. 2016. Zoonosis Division. National Centre for Disease Control, Delhi. <https://ncdc.gov.in/WriteReadData/l892s/File618.pdf>
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Protocol 3:

Protocol on First-Aid and CPR for Field Emergencies during HWC Mitigation Activities

HWC mitigation activities by their nature entail a certain degree of risk and danger to all the personnel involved. While all efforts must be made to prevent and avoid injury or danger to humans and animals in the field, accidents do occur. In these instances, it is important to be aware of the protocol for managing and treating such cases to preserve life, prevent further injury and ensure proper healing. Protocol for first-aid and first response during human field emergencies:

1. The most important thing to remember during field emergencies is to be calm, cool and confident.
2. It is important to have at least one member of the HWC team trained in handling field emergencies and first-aid and first-response procedures.
3. In the case of a field-related accident, injury (equipment or animal related), snake bite, etc., first ensure your own safety.
4. Next, evaluate the situation for further threats, extent of damage, number of personnel involved and kind of accident or emergency.
5. Check the person over. If they are not responsive and not breathing normally, then their heart has stopped working and they are having a cardiac arrest.
6. Depending on the level of threat, call the nearest doctor, clinic or hospital for an ambulance to be prepared to receive the patient. A list of the nearest health care facilities with the requisite emergency care kits (e.g., ventilators, oxygen support, anti-snake venom kits, anti-rabies shots) or those where the personnel are registered under medical insurance plans should be prepared by each HWC team (Annexure 3.4).
7. For any field-related injury, perform the following first-aid to prevent aggravation of the injury and to promote healing before hospitalisation:

(A) Animal bite. The primary aim of first-aid for animal bites is to control bleeding and prevent infections.

- a. Thoroughly irrigate the wound with copious amounts of clean water and iodine.
- b. DO NOT cover the wound with a dressing or bandage. Cover with a light gauze, if necessary.
- c. Note any unusual signs and symptoms in the injured person.

(B) Snake bite. The primary aim of snake bite management is to mitigate the spread and effect of the venom (details in Annexure 3.2).

- a. Treat the wound as with any animal bite.

- b. Note signs and symptoms as they appear, according to the protocol.

c. Follow the three R's:

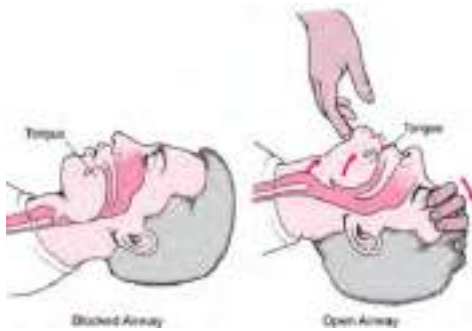
- i. Rest. Using a crepe bandage or similar bandage, bind the affected limb firmly. Reduce the activity of the casualty.
- ii. Reassure. Calm the patient.
- iii. Rapid evacuation. Immediately make arrangements to transport the casualty to a hospital.

(C) Physical injury due to falls or animal attack or other causes.

The primary aim of administering first-aid for a physical injury is to stabilise the patient until they can be taken to the nearest clinic/hospital for proper medical treatment. Once the patients(s) and injury are established, examine the patient for the ABCDES of first-aid.

- a. **Airway.** Ensure that the patient's airway is open. Tilt the head back. This lifts the tongue away from the airway and prevents blockage. Feel for and remove obstructions, if any (Fig. 1).
- b. **Breathing.** Ensure the patient is able to breathe. With the head tilted back (Fig. 2), Look for the rise and fall of the chest. Listen for breathing sounds. Feel for the breath on the face/cheeks and check the chest-wall integrity and symmetry.
- c. **Circulation:** Ensure that the heart is functioning and that there is no bleeding. Ensure that the heart is beating and that the circulation is active. Look at the skin colour, look for major bleeding, and look for capillary refill. Listen to the chief complaint/level of response (LOR). Feel for the pulse, its quality and its location (radial, femoral, carotid).
- d. **Deficits:** Assess the neurological status of the casualty – whether the casualty is alert and oriented, whether there any disabilities (injuries). Look at the casualty's behaviour and response. Listen to how the casualty is speaking – clearly, coherently or slurred. Feel to check for head injuries

- e. Environment: Ensure that the casualty is comfortable. Protect the patient from exposure to the environment—heat, cold, rain.
- f. Spine: C-spine (cervical spine)—stabilise the C-spine to prevent further injury.
 - (i) Cardio-pulmonary resuscitation (CPR). Perform CPR if necessary. Chest–mouth CPR should be performed only by a



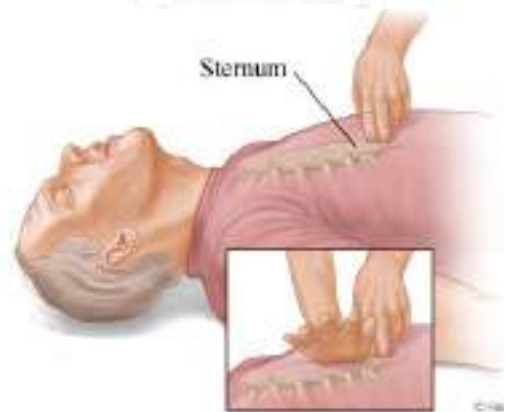
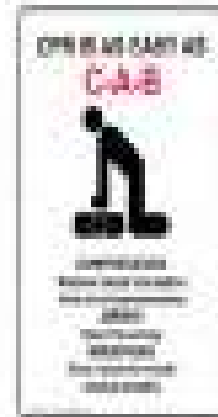
person trained in CPR. Untrained persons can perform non-mouth CPR. Detailed procedures are listed at the end of this protocol.

- (ii) Once the patient is stabilised, transport her or him to a hospital in an ambulance or appropriate vehicle with as little disturbance as possible.
- (iii) At the hospital, inform the doctor about the situation, the source of injury, the animal species involved, the snake species (in the case of a venomous snake bite), the chemical involved (in the case of chemical exposure), the medical history of the patient (if known) and any other relevant information.

(D) Any other ailment, e.g., cardiac arrest, pre-existing ailments. Depending on the cause of accident or emergency, follow the protocol for physical injury as appropriate and transport immediately to the nearest clinic/hospital.

Detailed procedure for CPR

- Chest–mouth CPR should be performed only by a person trained in CPR.



- Untrained persons can perform non-mouth CPR. Detailed procedures are listed at the end of this protocol.
- Place the patient on his or her back with the body stretched out and head tilted back (see accompanying figure).
- Perform the three steps of CPR:
 - Chest compressions—restore blood circulation with chest compressions.
 - Airway—clear the airway.
 - Breathing—give mouth-mouth rescue breaths.
- Give 30 chest compressions:
 - Kneel next to the person.
 - Place the heel of one hand in the centre of their chest (sternum; see figure).
 - Place your other hand on top of the first. Interlock your fingers.
 - With straight arms, use the heel of your hand to push the breastbone down firmly and smoothly so that the chest is pressed down between 5 and 6 cm, and release.

- Do this at a rate of two chest compressions per second for 30 compressions.
- Airway—Tilt the head back to open the airway.
- Two breaths:
 - Support the patient's jaw and open their mouth.
 - Pinch the patient's nostrils shut.
 - Form a seal over the patient's mouth and breathe into their lungs until they are fully inflated.
 - Remove the mouth to allow exhalation.
 - The two breaths should take no longer than 5 seconds.
 - Repeat until an ambulance arrives.
- Breath-to-compression ratio: 2/30—for every two breaths, perform 30 chest compressions.
- Even if you have not been trained in CPR with rescue breathing, you can still use hands-only CPR. Giving rescue breaths helps survival. But if you don't want to give rescue breaths, hands-only CPR is still likely to increase a person's chance of survival. Never do nothing.

- Put one hand on top of the other, interlinking your fingers. Your hand on the bottom should have the fingers open. Lock your fingers together, knuckles up.
- Then push down, in the middle of the chest right on the sternum.
- Push down 5 or 6 cm. That is about 2 inches.
- Push hard and fast about two times a second and 120 compressions per minute.
- Do not worry about hurting someone.
- A cracked rib can be mended—just concentrate on saving a life.
- Keep this up until the ambulance arrives.

References:

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Protocol 4:

Protocol on Occupational Health and Safety during Pre-capture, Capture (Physical/Chemical) and Handling of Wild Animals

Preparedness is one of the most important preventative measures that can be undertaken during any HWC mitigation operation. This includes preparedness prior to capture, during capture, while handling animals and during the transport of an animal to the destination. Standard safety procedures relating to PPE; the use, storage and handling of drugs and chemicals used during HWC activities; managing accidental exposure to capture drugs; first-aid, CPR, accidents and emergencies; vaccination and prophylaxis; and firearm safety have been dealt with in separate protocols. This protocol deals with safety procedures to be adopted with respect to the equipment used (including equipment used for chemical immobilisation), as well as animal-related accidents that may arise, during HWC mitigation operations.

1. Precautions for prevention of accidents related to equipment used

Wildlife capture and immobilisation necessitates the use of a wide array of equipment. For example, immobilisation drugs are delivered remotely using dart projectors, also known as remote drug delivery systems (RDDS), during the capture process. In certain other cases, alternative methods of capture (using physical restraint devices such as nets, traps, slings or cages) are used. Firearms are also carried as a backup when working with potentially dangerous carnivores or mega herbivores. All this equipment has the potential to induce severe trauma to humans when used inappropriately. Thus, these systems should be treated with the utmost respect, and personnel dealing with them should have proper training and practice in using the same. Further, field equipment should be maintained periodically, including cleaning, repair and proper lubrication. The operational status of the equipment should be verified before each capture operation.

1.1 Remote drug delivery systems

Darts with immobilising drugs are delivered to an animal using an RDDS, powered either by a powder charge or compressed gas (air or CO₂). These darts should thus be always treated as firearms, and personnel using RDDSs should have appropriate firearms training and practice firearms safety rules (see Protocol on Firearms Safety for further information). The following points may be considered in particular:

- Keep RDDSs unloaded when they are not actually in use.

- Whenever an RDDS is handled or handed to someone, visually check the barrel to ensure that it is empty.
- Do not load the chamber until deployment in the field, and never perform any undesired action with loaded equipment.
- Never alter or modify RDDSs, and have them serviced only by authorised dealers. These are complicated systems that are designed by experts to function properly in their original factory settings.
- Keep practicing with the RDDS in your possession whenever time permits, to get used to its functionalities.
- RDDSs should always be stored safely, in lockable and dry cabinets/carrying boxes and kept away from the reach of children and unauthorised persons.
- Lastly, never handle RDDSs under the influence of alcohol, intoxicants or even prescription drugs that can alter the state of the mind.

Physical capture equipment

The process of capture and restraint of wildlife often requires physical restraint (or a combination of physical and chemical restraint) using a wide variety of capture and handling devices that are available. These include corrals, bomas, drive nets, net guns, drop/rocket nets, mist nets, leg-hold traps, foot snares, box traps and cage traps. Some of these systems also pose potential risks to human health. The following points should thus be considered:

- Leg-hold traps and foot snare springs can produce significant bruising or crush injuries if improperly handled. They should always be deployed with extreme caution, using thick protective gloves and clothing. When not in use, the traps should always be kept in the closed/triggered position.
- Boma capture, or capture using drive nets, usually involves manual pursuit or chasing of hoof stock, thereby posing a potential injury risk to the personnel involved, either through physical falls or through the animals themselves. Proper precautions, including baffle boards and shin/arm/groin/chest guards, should always be used to avoid such injuries.
- Net guns and cannon nets have the potential to cause severe injuries to personnel if the lead weights present at the four corners strike the personnel. Caution should be exercised to avoid the same by keeping a close watch on the target animal's surroundings for

the presence of humans before triggering the systems. Since power from gunpowder is used to propel the nets, net guns should be treated with the same respect as firearms.

- Trap cages are often used for species that are difficult to pursue or approach on foot. Since they are used mainly to capture large predators, trap cages should be sturdy, well maintained and escape-proof to avoid any untoward accidents.
- Vehicle safety. Conflict mitigation and capture operations necessitate the use of various kinds of motor vehicle, including tractors (with or without trailers), lift trucks or cranes, 4 × 4 trucks and transport, patrol or other utility vehicles. To ensure personnel safety, only authorised personnel with a driving license and trained in the motoring of such vehicles should be designated to use such vehicles. These vehicles should be properly maintained, and it should be ensured that they are suitable for the task assigned. Further, these vehicles should have warning devices, such as hooters, and be properly labelled as 'Rescue' vehicles to facilitate easy identification during field operations.

2. Precautions for prevention of animal-related accidents

Animal-related accidents during capture and immobilisation can be categorised into three main types: physical injury directly inflicted by animals, such as bites, kicks, claw scratches, crush injuries, horn wounds; physical injury, such as falls, trips, abrasions, due to accidents or failure to observe other hazards; and, biological or systemic injury sustained through zoonotic diseases transmitted from handling potentially diseased animals. The following precautions must be observed to prevent such injuries:

- Personnel working in HWC response teams should be educated adequately regarding the natural history and behavioural aspects of the target species, viz., the size and power of the animal or the species in general; the natural group instincts and hierarchical behaviour of the animal; the predatory nature of the animal; the reaction of humans and animals to fear; and the fact that some animals have an innate ability to kill/injure.

The response team should be provided with adequate apparel or PPE such as long-sleeved shirts/dungarees, slip-proof shoes, baffle boards, shin/arm/groin/chest guards and bite-proof helmets. Face protection, such as masks or goggles, may be appropriate where there is a risk of body fluids splashing on the face, particularly the eyes. Any employee required to wear respiratory protective equipment (RPE) should undergo a face-fit test to ensure that the equipment can be worn correctly. For more information, refer to the Protocol on PPE.

Public health professionals should be consulted to determine disease threats and vaccine requirements or prophylaxis in response teams specific to the geographic region in which the HWC mitigation operations are being carried out. On the basis of these inputs, the entire team should be subjected to prophylaxis regimens, including booster doses at suggested intervals. For more information, refer to the Protocol on Vaccination and Prophylaxis.

References

- McKenzie, A. A. 1993. (Ed.) The Capture and Care Manual: Capture, Care, Accommodation and Transportation of Wild African Animals. Wildlife Decision Support Services CC and The South African Veterinary Foundation. 629 pp.
- Handbook of Wildlife Chemical Immobilization. Fifth edition. Terry J. Kreeger and Jon M. Arnemo. 2018.

Protocol 5: Protocol for Firearm Use and Safety during HWC Mitigation Operations

There will be occasions during HWC mitigation operations when the use of firearms will be justified in order to put down animals in conflict that cannot be rescued or rehabilitated. In such cases, HWC mitigation teams may have to resort to using these firearms, and therefore it is important to follow important safety protocols to avoid accidents and unintentional harm to humans or animals. It must be pointed out that during HWC mitigation activities, all remote injection systems (blowpipes, gas-powered pistols and rifles) are also to be treated as firearms and are therefore also referred to as such in this protocol.

The following safety precautions and protocols must be followed during the handling of any firearms during HWC activities.

No HWC team member should handle any firearms before they have been briefed on their safe use by an appropriate expert.

1. The following firearms safety protocol should be followed:

- a. All firearms are to be handled as if loaded at all times.
- b. On picking up a firearm or receiving one from someone else, make sure it has been made safe (safety catch on, if it has one, and not pressurised).
- c. Always point firearms at the ground or, if not possible, at least away from people and animals.
- d. Always delay loading firearms (even with darts) until they are required for use (this will depend on the situation).
- e. Always delay pressurising firearms until the last safe moment.
- f. Always keep the safety catch on until the firearm

is required for use

- g. Always keep watching the widest possible arc (for people or other animals moving into the firing line) until the last safe moment.

2. Use the marksmanship principles when discharging any firearm:

- a. The position and hold must be firm enough to support the firearm.
- b. The firearm must point naturally at the target without any undue physical effort.
- c. Ensure that the sight is aligned with the target before firing.
- d. The shot must be released and followed through without undue disturbance of the position.
- e. After discharging any firearm, make sure that it is made safe before doing anything else.
- f. Check that the safety catch is on (reapplied), if the firearm has one.
- g. Check that the firearm is de-pressurised fully before and after handling it.
- h. Check that the firearm is stored securely or responsibly before it is passed to someone else.
- i. For darts and drugs, follow the following procedure:
 - i. Wear protective hand and eye cover whilst preparing darts.
 - ii. Always work in pairs when using dangerous drugs.
 - iii. Have appropriate reversal drugs readily available for use if required.
 - iv. Do not carry pressurised darts unprotected.
 - v. Handle darts carefully after use as per the SOPs 'Safety during Captures' and 'Safe Usage and Storage of Drugs'.

Protocol 6: Protocol on Safe Usage and Storage of Drugs Used in HWC Mitigation

Drugs designed for remote delivery are often very potent. Serious toxicity and even death can result from accidental human contact with these drugs. Capture drugs must always be handled with care, and the level of vigilance must always be high. The following points must be kept in mind during the use, handling, storage and transport of drugs or chemicals used during HWC mitigation:

1. Drugs designed for capture of wild animals should only be handled by registered veterinary practitioners who are thoroughly trained in the use of capture drugs and wildlife restraint and anesthesia techniques.
2. All legal requirements and regulations regarding ordering, storage, use, inventory and disposal of these drugs should be strictly observed.
3. The veterinarian should regularly review and rehearse safety and emergency procedures with all the staff members concerned.
4. This protocol on safe usage, storage, disposal and accidental exposure to drugs used to capture wild animals should be kept with the immobilisation and emergency kits at all times and should be available during such procedures.
5. All personnel involved in wild animal captures should be made aware of the potential danger from accidental exposure to the drugs.
6. Use potent drugs only in the presence of a second person who is trained in their use and in the management of accidents.
7. Always wear goggles or safety glasses, a face mask or shield and protective gloves (preferably two pairs), especially when working with potent narcotics. Where possible, wear long-sleeved and long-legged pants and a shirt or coveralls. Coveralls can be quickly removed if a drug is spilled on them.
8. Know basic first-aid techniques, including CPR.
9. Always concentrate on what you are doing and work in an orderly fashion
10. NEVER eat, drink, smoke or rub your eyes when working with capture drugs.
11. If you have cuts or abrasions on your hands, apply a plaster on the affected area and wear gloves.
12. Clean water in a proper container should be readily available during immobilisation operations to flush any spilled drug from skin.
13. Drugs should be drawn into syringes just before use to avoid keeping filled syringes. Also keep reversal agents (for the animal) in labelled syringes for ready use if required. Record the name and amount of the immobilisation agent before the vials are opened and maintain a record of the amounts used, dates used, species used on, etc. to maintain an inventory.
14. Be careful never to inhale drugs that are in powder or aerosol form.
15. Never work with opioid drugs in a moving vehicle.
16. Never work with opioid drugs without having the human antidote at hand in the first-aid kit.
17. Darts should be loaded slowly and away from other people.
18. Do not push air into the vials of potent drugs as the drugs may leak out.
19. Use a small syringe with a thin needle for drawing up concentrated solutions.
20. Never over-pressurise bottles containing these drugs. In high-altitude or other high-pressure areas, use a drug chamber (made of a simple cardboard box) to avoid accidental release.
21. Keep the bevel of the syringe and needle pointed away from you at all times.
22. Use pliers to replace or remove needle caps.
23. Loaded darts should be capped and placed in safe, leak-proof containers that are clearly marked with the name of the immobilising agent used. All items similarly contaminated by the drug, such as used darts and loading syringes should also be placed in the same container for rinsing or disposal later.
24. Consider all dart guns as loaded and all darts as filled until you know otherwise.
25. Lock all capture drugs away when they are not being used.
26. Label all drugs, containers, unused darts and filled syringes that are not used immediately.
27. Avoid using narcotic drugs such as etorphine and carfentanil in blow pipes. If possible, use a hand-held pump instead of blowing using blow pipes.
28. All personnel should stand behind the veterinarian or person operating the dart gun during the immobilisation procedure to avoid mishaps due to accidental misfiring.
29. All darts, syringes and immobilisation guns should be treated as fully loaded firearms.
30. Once animals are darted, the darts should be removed carefully to prevent accidental release of un-released, pressurised drugs.

31. Blood from a dart wound may contain the drug.
32. After the capture procedures have been completed, all darts, syringes and needles shall be properly disposed of or properly stored for proper disposal.
33. Darts should be de-pressurised before they are cleaned and rinsed.
34. Needles and used syringes should be disposed of in the sharps container along with empty drug bottles.
35. In case of any contact with skin or mucous membranes, wash immediately using copious quantities of water.
36. Be very careful when removing darts from recumbent animals.
37. Symptoms of narcotic spills/contact/overdose in humans should be monitored. Prompt should be action taken when the following symptoms are noticed:
 - nausea and vomiting
 - dizziness and discoordination
 - respiratory depression

- cold skin
- severe drop in blood pressure
- loss of consciousness
- muscle rigidity
- pin-point pupils/miosis

These symptoms can progress to coma and cardiovascular collapse with severe intoxication.

References/Sources

- Petrini, K. R. and Keyler, D. E. 1993. Immobilizing agents-: Developing an urgent response protocol for human exposure. Proceedings of American Association of Zoo Veterinarians.
- McKenzie, A. A. 1993. (Ed.) The Capture and Care Manual: Capture, Care, Accommodation and Transportation of Wild African Animals. Wildlife Decision Support Services CC and the South African Veterinary Foundation. 629 pp.

Protocol 7:

Protocol on Response and First-Aid for Accidental Exposure to Drugs Used in HWC Mitigation

When appropriately used, chemical immobilisation can be employed to safely restrain and capture many species, thereby minimising stress and the risk of injuries associated with other restraint methods. Because smaller volumes of drugs are more easily delivered via remote drug delivery systems, most drugs used for wildlife anaesthesia are extremely potent and pose significant hazards to the people using them. This is especially true for potent opioid drugs such as carfentanil, thiafentanil, etorphine, alpha-2 agonists and medetomidine and psychotropic drugs such as ketamine. Accordingly, capture drugs must always be handled with the utmost care and highest level of caution. The following protocol must be followed in case of an accidental exposure to drugs used for capture of wild animals during HWC mitigation activities:

1. In case of an accidental exposure to a narcotic or immobilising agent, immediately call for expert medical help as it requires at least two persons to handle a drug accident victim effectively.
2. Observe and note the symptoms seen on exposure to the drugs (including the package insert of the drug), preliminary first aid and treatments given and the response.
3. When a person exposed to a drug is treating himself or herself, another person should be made aware of the nature of the drug, the symptoms observed and the treatment undergone.
4. The personnel involved in tranquilisation must all know the drugs used, and the ready-to-use labeled antidotes should be kept in the kit, along with details about the mode of administration when accidental exposure to drug occurs. In case the drug used is not known, a general antidote such as naloxone may be administered after consultation with experts. Limit the drug absorption by washing the contact surface with copious amounts of water.
5. When drug absorption occurs in a limb, apply a tourniquet proximal to the injection site to delay distribution of the drug. Release the tourniquet once the antidote has been administered and has had a chance to be absorbed. Do not keep a tourniquet on for more than 40 minutes.
6. Precautions during accidental exposure to drugs.
 - Monitor the patient continuously and determine the quantity of the specific drug absorbed and give an additional dose of the antidote if required.
 - Keep the patient in the shade and loosen or remove all restrictive clothing.
 - Try to keep the patient's body temperature normal, and keep him or her warm.
 - Keep reassuring the patient to remove any fear and panic and provide all comfort.
 - Support the circulation by laying the patient horizontally on his or her side to prevent vomiting. Keep the legs slightly higher than the rest of the body. In severe cases, establish an IV drip as soon as possible, before the blood pressure drops. Administer CPR (see separate protocol) if needed.

7. First-aid kit for capture operations

Basic components

Equipment	Emergency Medicaments
Pulse-oxymeter—1	Intravenous saline (0.9%) solution—2 litres
Stethoscope—1	Intravenous colloidal solution—2 litres
Thermometer—1	Naltrexone hydrochloride* (50 mg/ml) × 1
Ambu® bag with face mask—1	Yohimbine/atipamazole (20 mg/ml) × 1
Portable oxygen cylinders—10–15 liters	Hydrocortisone (250 mg) × 1
IV drip sets × 2	Diazepam (2 mg) × 10
Sterile IV cannulas—21G × 5	Atropine (5 mg) × 5
Adhesive tape—2	Adrenaline (20 mg) × 5
Disposable syringes—2 ml and 10 ml × 10 each	Respiratory analeptics (doxapram hydrochloride)
Hypodermic needles—18G and 21G × 20	Neostigmine (10 mg)
Pressure bandage, roll gauze and cotton	Broad spectrum antibiotics × 2
Scissors and forceps × 2 each	Antiseptic ointments or powders × 2
Tourniquet and clamp × 1 set	Anti-snake venom serum × 2

*Naloxone can also be used, if available, though doses can vary from 1 to 5 mg per kg body weight.

8. Exposure to specific drugs/drug classes

- a. **Narcotics/opioids.** These include currently used drugs such as etorphine, carfentanil and thiafentanil, although many new opioids may soon be used in the country.

These drugs are similar in their action and toxicity. Etorphine has been used as the specific example here, with 1 mg of carfentanil being equivalent to 2.5 mg of etorphine and 15 mg of thiafentanil being equivalent to 1 mg of etorphine.

- Etorphine is not absorbed through intact skin; nevertheless, always wash off any etorphine as soon as possible after it comes into contact with skin.
- Etorphine is absorbed through broken skin (cuts), as well as via the membranes of the eyes, nose and mouth.
- Never put anything into your mouth or rub your eyes with your hands when working with etorphine.
- First-aid
 - Immediately inject up to 1 mg of naloxone IV, followed by 0.4–0.8 mg IV every 2–4 minutes post-exposure. Note that IV administration of naloxone can cause nausea and vomiting.
 - Alternately, administer 25–50 mg (0.5 to 1.0 ml) of naltrexone IM (leg or arm), followed by 25–50 mg (0.5 to 1.0 ml) of naltrexone IV into a vein of the forearm. If you cannot find a vein, administer the naltrexone into the muscle as well and massage the area.
 - Try to determine the amount of etorphine that has been absorbed.
 - Use an additional 1 ml of naltrexone per 1 mg of etorphine.
 - If there is no improvement, or if there is deterioration, give additional naltrexone.
 - The breathing will begin to improve instantaneously upon administration of the antidote, with the rate and depth of breathing improving.
 - Naltrexone is a very safe antidote, and overdosing does not occur.
 - Administer additional naltrexone if the breathing remains slow or shallow.
 - If there has been no response to the antidote and the condition is critical, administer doxapram at 3 ml/70 kg IV after a consultation. The dose can be repeated every 10 minutes, but doxapram in high doses can cause convulsions.
- b.** Shift the patient to a medical facility as soon as possible and inform the physician about the specific drug to which there has been exposure, the symptoms observed and the treatment given.
- c. Alpha-2 agonists.** These include drugs such as xylazine, detomidine and medetomidine. Xylazine is rarely fatal even at high doses. Medetomidine, on the other hand, can cause human intoxication with a very small-volume exposure—150 µg can induce significant bradycardia and a reduction in blood pressure. A dose of 120 µg (0.012 ml of 1% solution) of medetomidine has been reported to induce sleep

in 50% of human males.

The main signs of intoxication by alpha-2 **agonistic drugs include**

- bradycardia
- irregular heartbeat
- hypotension
- sleep and unconsciousness
- respiratory depression
- First-aid
 - Only supportive care can be provided.
 - If the heart rate falls below 40 beats per minute, give 0.5 mg atropine.
 - This can be repeated three times every 5 minutes until the heart rate increases.
 - Do not use an antidote (atipamezole)—atipamezole is not approved for human use and can compound the problem.
 - Fluid therapy
 - Administration of supplemental inspired oxygen and ventilator support

c. Cyclohexamines. These include drugs such as tiletamine and ketamine.

- Signs of intoxication
 - Initially, this group produces symptoms of excitability.
 - Large doses can result in severe respiratory depression, hypertension and eventually coma.
- First-aid
 - No antagonist is currently available.
 - Remain with the exposure victim, keep the patient comfortable, monitor the respiration, and be prepared to provide CPR if necessary.
 - Transport the patient to a hospital as soon as possible.
 - The physician should be informed about the particular drug exposed to, its quantity (if assessed) and the first-aid given. Provide the package insert of the drug to the treating physician.
 - If the patient was exposed to Telazol® (tiletamine/zolazepam), the physician is to be informed that the effects are similar to those of ketamine and diazepam.

d. Other drug classes include alpha-2 antagonists (e.g., yohimbine, tolazoline, atipamezole), butyrophenones (e.g., azaperone, haloperidol, droperidol), phenothiazines (e.g., acepromazines, Cclorpromazines) and benzodiazepenes (e.g., diazepam, midazolam). Many of these drugs have not

been tested on humans or have not been linked to specific symptoms of poisoning. In case of accidental exposure to these drugs, follow the general protocol given in the foregoing.

References/Sources

- Petrini, K. R. and Keyler, D. E. 1993. Immobilizing agents-: Developing an urgent response protocol for human exposure. Proceedings of American Association of Zoo Veterinarians.
- McKenzie, A. A. 1993. (Ed.) The Capture and Care Manual: Capture, Care, Accommodation and Transportation of Wild African Animals. Wildlife Decision Support Services CC and the South African Veterinary Foundation. 629 pp.

PROTOCOL 8:

Standard Protocol for Human Health and Safety During Collection, Handling, Storage and Transport of Samples

It is common practice to collect biological samples from wild species during HWC mitigation activities. Appropriate protocols for sample collection, handling, storage and transport should be strictly followed to avoid endangerment of human health and safety. Proper handling during sample collection and transportation also ensures that the sample quality is maintained and that the samples can be used for diagnostic and other tests.

The following precautions are necessary:

All biological specimens are potentially infectious and should be treated as bio-hazards and should be handled with utmost care.

- All personnel participating in HWC mitigation activities and in sample collection and transportation activities must be briefed about the safety precautions before sample collection activities to avoid accidental exposure to biological, chemical or physical hazards.
- The HWC mitigation response team should always carry a first-aid kit in their vehicle and be aware of the safety of themselves, their team members and the animals concerned.
- Prior to sample collection, a risk analysis exercise should be conducted to identify potential threats/hazards to human safety, which include the following:
 - Bites and scratches. During HWC mitigation operations, wild animals (carnivores, crocodilians, snakes, etc.) may cause bites, scratches and other injuries. Therefore, for protection, PPE customised for species-specific behaviour should be used. All injuries should be immediately cleaned, disinfected and treated appropriately. Snake-bite treatment protocols should be followed immediately in case of snake bites, and a medical doctor should be consulted immediately. It is advisable to take prophylactic vaccinations (tetanus, rabies, etc.) as per the guidelines available with the National Centre for Disease Control (NCDC), New Delhi. Zoonoses are diseases transmitted by wild animals (e.g., rabies, tick-borne diseases, brucellosis, anthrax, toxoplasmosis, leptospirosis and salmonella), especially when there is close contact during HWC mitigation, sample collection, handling and transport activities. All personnel involved must be made aware of threats from, as well as the transmission routes of, the same. All personnel must take precautions and follow management protocols to minimise the risk of disease transmission to protect themselves and their team members.

- Allergies. Some personnel may develop allergies when they come in contact with animal materials such as hair and dander. Personnel with a predilection to developing allergies should wear respiratory masks, gloves and fully covering pants/shirts when handling animals. People with severe animal-associated allergies, or with compromised immune systems (due to autoimmune or immune-deficiency diseases or immunosuppressant therapy) should not be involved in handling of wild animals in HWC mitigation activities.
- Chemicals. Personnel should be aware of the dangers of the chemicals they use in the field. They should read and be aware of the Material Safety Data Sheets (MSDS) relevant to the chemicals they may be using (e.g., methylated spirits, ethanol). Many of the chemicals used for biological sample storage and transport may cause irritation to skin and mucous membranes on contact. Wash the areas involved with plenty of water and contact a physician if the irritation persists. If these chemicals are ingested, drink copious amounts of water and call a physician.
- Fire risk. Personnel intending to clean and sterilise equipment by flaming should be aware of the associated fire risk and take appropriate actions to reduce this risk.

Protocol for biosafety during sample collection, handling, storage and transport

- Only trained and experienced personnel (or those working directly under the supervision of such personnel) should collect biological samples from live or dead animals. Personnel handling animals should be trained in appropriate capture and handling protocols for the species concerned, while those collecting samples should be trained in appropriate biosafety protocols for sample collection from live and dead wild animals.
- All materials and equipment used for collection should be ready a priori.
- Hands should be thoroughly cleaned before and after collection procedures.
- Appropriate PPE should be worn by the personnel while handling the animal and during collection of samples, and the PPE should be disposed of appropriately after use (as given in the waste disposal section of this SOP).
- Although it is difficult to ensure sterile conditions in the

field, it is important to ensure cleanliness throughout the sample collection and transport procedure to minimise the risk of exposure to identified threats and to obtain good samples.

- Ensure that live animals are properly restrained before attempting to collect samples.
- In the case of dead animals, ensure that the vicinity of the dead animal is clean and free of flies and other insects that may potentially cross-contaminate from the carcass to the personnel. Avoid coming into contact with leaked body fluids.
- If possible, ensure that the area to be sampled is free of ecto-parasites (ticks, mites) before proceeding with the sampling.
- In case of any spillage or leakage of samples (e.g., body fluids), they should be cleaned and disinfected carefully to minimise further exposure, and all areas should be disinfected immediately.
- All needles, sharps and contaminated cotton or equipment should be disposed of in a bio-hazard bag or sharps container to minimise exposure.
- Make sure that there is no visible contamination or leakage outside the sample container and that no sharps are present that could potentially expose the person opening the package to pathogens or other risks.
- Sample collection tubes and vials should be labelled properly with species ID, individual ID, place of collection, date of collection and type of sample. Labelling should ideally be done before the sampling procedure to ensure cleanliness. Labelling after sample collection should be done using clean, new gloves and pens that have not been used for collecting the sample. Labels should be non-absorbent or waterproof, preferably laminated.
- All equipment used to obtain tissue samples should be cleaned and disinfected between animals and prior to returning the equipment for storage. This can be done

by flaming:

- a. Dip the equipment to be used for obtaining the sample into 70% ethanol and clean it with a swab to remove gross dirt, leftover tissue, etc. (Note: Since ethanol is a highly flammable substance, care should be taken that only the equipment needing to be flamed comes into contact with the ethanol.)
 - b. Clean up any spillages immediately, including any ethanol on hands and clothing. Wait until the spilled ethanol has evaporated before continuing with the procedure.
 - c. Re-dip the equipment to be used for obtaining the sample in the ethanol and flame the cutting part with a lighter or portable flame torch. (Note: The flame from ethanol is not visible in sunlight.)
 - d. Allow the equipment to cool before using it.
 - e. DO NOT allow contact with any other biological material (including human fingers) before the next animal is sampled.
- Flaming is the most common method for cleaning and disinfecting equipment, but in fire-risk areas it may not be possible to use it or it may not be appropriate. Using 70% isopropyl alcohol medical swabs is a suitable alternative.
 - For single-step disinfection, equipment can be soaked in a disinfectant solution (e.g., 10% bleach or other commercial disinfectant) for 10 minutes and rinsed subsequently with de-ionised water.

References

- Department of Biodiversity, Conservation and Attractions (2017). Standard Operating Procedure: Tissue Sample Collection and Storage for Mammals. Perth, WA: Department of Biodiversity, Conservation and Attractions.
- Standard Operating Procedures. 2003. Veterinary Wildlife Services, South Africa.

Protocol 9:

Protocol for Storage, Transport, Treatment and Disposal of Biomedical Waste Generated During HWC Mitigation Operations

Waste management practices should primarily focus on minimising the health problem and reducing the potential risks to workers associated with HWC operations. The biomedical waste (BMW) produced in the process of chemical immobilisation, capture, handling, care and transportation of wild animals involved in HWC and collection of samples from them may generate health risks.

BMW waste generated in HWC situations and rescue centres may consist of:

- Anatomical waste such as tissues, body parts or whole carcasses
- Animal waste such as faeces and vomitus produced during transportation and in rescue facilities
- Waste items such as needles, syringes, scalpels, broken glass ampoules and injection bottles
- Used or discarded medicine and drug vials, wound-dressing material, material contaminated with blood, used infusion sets

These wastes carry a greater risk of infection and injury than do any other waste. Therefore, safe and reliable methods of waste handling are essential. These methods must comply with the Bio-Medical Waste Rules, 2016. A casual and improper approach to waste management may have serious public health and environmental health consequences.

1. The concept of 3Rs (reduce, recycle and reuse) should reflect in the handling of biomedical waste. According to WHO's Safe Management of Wastes from Health-Care Activities, the BMW disposal method should be used to prevent, reduce, reuse, recycle, recover, treat and, lastly, dispose of waste.
2. Other wastes should be disposed according to the following rules:
 - Radioactive wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962).
 - Hazardous chemicals as covered under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.
 - Solid wastes as covered under the Municipal Solid Waste (Management and Handling) Rules, 2000.
 - Lead acid batteries as covered under the Batteries (Management and Handling) Rules, 2001.

- Hazardous wastes as covered under the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.
- Waste covered under the e-Waste (Management and Handling) Rules, 2011.
- Hazardous micro-organisms, genetically engineered micro-organisms and cells as covered under the Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms, Genetically Engineered Micro-organisms or Cells Rules, 1989.

Safe storage, transport and disposal of biomedical waste (BMW) generated during HWC mitigation activities

1. All waste generated during HWC mitigation activities, such as gloves, disposable coveralls, syringes, needles, empty drug containers, used and disposable equipment and any other disposable material should be segregated and stored in respective bags (see Annexure 3.7). Segregation helps reduce the effort required in subsequent steps of handling, recycling, illegal reuse, treatment and disposal of waste.
2. Persons handling BMW should wear appropriate PPE such as gloves, aprons, masks and leg-covering boots or boot covers when handling the waste.
3. All sharp objects must be collected in puncture-proof sharps containers to avoid accidental injury and exposure.
4. The BMW should be stored in the designated area with proper labelling, and the storage area should be marked with a caution sign. Any wild animal-anatomical waste must not be stored without the permission of the Chief Wildlife Warden.
5. The waste should be transported for treatment in a closed vehicle in the designated container/bag, properly tied, labelled and made spill-proof, with a document signed by the veterinary doctor that mentions the date, site, quantity and destination.
6. The transport vehicle used must have closed partitions so as to prevent direct contact between the waste and scavengers and the staff carrying it.
7. The driver of the transport vehicle should also be trained in the procedures to be followed in the case of an accidental spillage or exposure, including filling out an accident report form (Annexure 3.8).

8. BMW should be transported to a common bio-medical waste treatment facility' (CBMWTF) nearby for treatment and disposal. As per the Bio Medical Waste Rule, 2016, a rescue centre/health care facility, or other centres, generating BMW shall not establish an on-site treatment and disposal facility if a service of a CBMWTF is available within a 75-km radius.
9. Disposal of waste in rural areas or remote areas should be carried out only with prior approval from the prescribed authority, using deep-burial methods, as per the standards specified in Schedule-III of the Bio Medical Waste Rule, 2016.

References

- Bio-Medical Waste Management Rules, 2016. Ministry of Environment, Forest and Climate Change. Government of India. Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i).
- https://www.aiims.edu/images/pdf/Departments_Centers/BiomedicalWaste.pdf

TOOLS

Tool 1: Zoonotic diseases that can be transmitted from wild animals

S. no.	Disease	Animal	Probable means of spread to man
BACTERIAL			
1	Anthrax	Mammals, especially elephants, deer, antelopes, large carnivores	Through the skin, inhalation or ingestion of spores
2	Brucellosis	Large herbivores, large carnivores, cattle, sheep, goats, pigs, dogs	Direct contact with excretions and secretions, including the milk, of infected animals
3	Tetanus	Mammals	Bite wounds, contamination with spores
4	Salmonellosis	Reptiles, birds, poultry, rodents	Ingestion of food and water contaminated with faeces
5	Glanders	Equids and felids	Nasal discharge and necropsy exposure
6	Leptospirosis	Most domestic and wild animals, especially rodents, foxes, felids, hares, bats	Direct contact with urine or tissues or aborted fetus
7	Plague	Rodents, hares, cats and dogs	Fleas, contact with sick animals, inhalation
8	Psittacosis	Parakeets, pigeons and geese	Inhalation and contact with faeces or feathers
9	Pasteurellosis	Domestic and wild animals	Contact and ingestion of infected material
10	Tularaemia	Rodents, dogs, cats and sheep	Contact with infected animals and arthropod bites
11	Tuberculosis	Cattle, pigs and non-human primates	Inhalation and ingestion
12	Relapsing fever, scrub typhus, Rocky Mountain spotted fever and other tick-borne fevers	Rodents, mammals	Tick bites
FUNGAL			
13	Ringworm	Mammals and birds	Direct contact and fomites
14	Aspergillosis	Birds	Inhalation of spores
PARASITIC			
15	Malaria	Non-human primates	Mosquito bites
16	Amoebic dysentery (protozoal origin)	Non-human primates, reptiles	Contact, ingestion of contaminated food and water with faeces
17	Giardiasis	Non-human primates, dogs	Contact, ingestion of contaminated food and water with faeces
18	Trypanosomiasis	Wild and domestic ruminants, dogs and cats	Bites of infected tsetse flies, contamination of wounds with faeces of bugs and blood transfusions
19	Toxoplasmosis	Felids, canids and other mammals	Ingestion of contaminated food and water with faeces of cats and ingestion of infected meat
20	Echinococcosis and hydatidosis	Wild carnivores, dogs and cats	Ingestion of contaminated food and water with faeces of animals
21	Visceral larva migrans	Wild carnivores, dogs and cats	Ingestion of uncooked meat, food and water contaminated with faeces of animals, contact
22	Trichinosis	Pigs, bears and carnivores	Ingestion of infected raw or half-cooked meat
23	Taeniasis and cysticercosis	Ruminants, pigs, cattle	Ingestion of eggs in raw or improperly cooked meat
24	Sarcocystosis	Wild canids, wild and domestic ruminants, dogs, pigs	Ingestion of raw or improperly cooked meat, ingestion of food and water contaminated with faeces of animals

S. no.	Disease	Animal	Probable means of spread to man
VIRAL			
25	Rabies	Mammals and bats	Bites of diseased animals, inhalation
26	Nipah virus infection	Bats	Inhalation of air contaminated with droplets containing the virus
27	Kyasanur Forest Disease (KFD)	Macaques	Bites from infected ticks
28	Influenza type A (H1N1, H2N2, etc.)	Water and migratory birds, poultry, pigs	Inhalation of air contaminated with droplets containing the virus
29	FMD	Cattle, pigs, wild ruminants	Contact
30	Equine encephalomyelitis	Rodents, reptiles, amphibians, monkeys, dogs, cats, foxes, skunks, cattle, pigs, birds, equids	Mosquito bites
31	Hepatitis E virus (HEV) infection	Non-human primates, rodents, pigs, sheep	Ingestion of contaminated food and water with faeces of animals, contact
32	Japanese B encephalitis	Wild birds, pigs and horses	Mosquito bites
33	Lymphocytic choriomeningitis	Monkeys, dogs, guinea pigs	Excretions and secretions of sick animals
34	Viral haemorrhagic fever (multiple species— Filoviridae, Ebola virus, Lassa virus, Marburg virus)	Non-human primates, bats	Inhalation of air contaminated with droplets containing the virus, contact
35	Other arboviral infections (togaviruses, <i>Flavivirus</i> , bunyaviruses, arenaviruses)	Insects, wild and domestic birds, bats, deer, rodents	Tick or mosquito bites
36	SARS-CoV-1 and SARS-CoV-2-related diseases	Bats, pangolins (?)	Inhalation of air contaminated with droplets containing the virus, contact
37	Ranikhet disease	Fowl, including peacocks, poultry	Contact with sick birds

Tool 2: Snake-bite management

(Adapted from: STANDARD TREATMENT GUIDELINES: Management of Snake Bite, Quick Reference Guide, January 2016, Ministry of Health & Family Welfare, Government of India)

Envenoming due to snake bites causes approximately 49,000 deaths, annually, in India (Mohapatra et al., 2011). Of these, about 67% are due to the bite of the common krait (Majumdar et al., 2014). Timely clinical intervention and administration of anti-snake venom (ASV) is the only way to save lives. The clinical presentation of a snake bite victim depends upon the species of snake, the amount of venom injected, season of the bite, whether the snake is fed or unfed, the site of the bite, whether the area was covered or was not covered, whether the bite was dry or incomplete, whether there were multiple bites, venom injection in vessel, the weight of the victim and the time that elapsed between the bite and the administration of ASV. The venom concentration and constitution depends on environmental conditions as well as the snake's age and the darkness of its colour (Bawaskar HS et al., 2014).

FIRST-AID MEASURES after snake bites

Do's

- Seek medical help right away.
- Call an ambulance (toll free no. 102, 108, etc.) or arrange to transport the patient to a medical health facility with an anti-snake venom (ASV) facility as quickly, safely and passively as possible, by vehicle, boat, bicycle, motorbike, stretcher, etc. Create a list of the closest such facilities as indicated in Tool 3.
- Keep the person calm. Reassure the person that around 70% of all snake bites are from non-venomous species and that snake bites can be effectively treated in an emergency room.
- Restrict the movements, and keep the affected area below the heart level to reduce the flow of venom. Remove any rings or constricting items because the affected area may swell.
- Immobilise the limb in the same way that a fractured limb is. Use bandages or cloth to hold the splints (wooden sticks, rulers, etc.), but do NOT block the blood supply or apply pressure.
- Create a loose splint (it should be possible to insert one finger) to help restrict the movement of the area.
- Ideally, the patient should lie in the recovery position (prone, on the left side), with his/her airway protected to minimise the risk of aspiration of vomitus.
- If the area of the bite begins to swell and change colour, the snake was probably venomous.
- Monitor the person's vital signs—temperature, pulse, rate of breathing and blood pressure—if possible. If there are signs of shock (such as paleness), lay the person flat, raise the feet about a foot, and cover the person with a blanket.

Don'ts

- Do NOT waste time in traditional first-aid methods.
- Do NOT allow the person to become over-exerted. If necessary, carry the person to safety.
- Do NOT apply a tourniquet.
- Do NOT block the blood supply or apply pressure.
- Do NOT apply cold compresses to snake bites.
- Do NOT cut into a snake bite with a knife or razor.
- Do NOT try to suck out the venom by mouth or wash the wound.
- Do NOT give the person stimulants or pain medications unless a doctor tells you to do so.
- Do NOT give the person anything by mouth.
- Do NOT raise the site of the bite above the level of the person's heart.
- Do NOT attempt to kill or catch the snake as this may be dangerous. Bring in the dead snake only if it is already dead and if this can be done safely.
- Do NOT waste time hunting for the snake, and do NOT risk another bite if it is not easy to capture the snake. Be careful of the head when transporting it, even if the snake is dead—a snake can actually bite for several hours after it is dead (from a reflex).

For further information, please refer to the 'Guidelines on Human-Snake Conflict Mitigation: Taking a Harmonious-Coexistence Approach'.

References

- Mohapatra B, Warrell DA, Suraweera W, Bhatia P, Dhingra N, Jotkar RM, Rodriguez PS, Mishra K, Whitaker R, Jha P, for the Million Death Study Collaborators. Snakebite mortality in India: A nationally representative mortality survey. *PLOS Tropical Neglected Diseases*. 2011. DOI: 10.1371/journal.pntd.0001018
- Majumder D, Sinha A, Bhattacharya SK, Ram R, Dasgupta U, Ram A. Epidemiological profile of snakebite in South 24 Parganas District of West Bengal with focus on underreporting of snakebite deaths. *Indian J Public Health* 2014;58: 17–21.

Tool 3: List of government hospitals or clinics stocking rabies vaccine, anti-venom and antidotes

Facility type	Name of hospital/ clinic/PHC/medical facility	Name of contact person	Address	Telephone numbers (ambulance number)
Emergency	1.			
	2.			
Anti-snake venom (ASV)	1.			
	2.			
Anti-rabies vaccination	1.			
	2.			
Drug and chemical poisonings and antidotes	1.			
	2.			

Tool 4: Line departments and other personnel involved in HWC

Department/ agency	Name of contact person	Address	Telephone/email
Police			
Fire brigade			
Chief Medical Officer (CMO)			
Chief Veterinary Officer (CVO)			
Block Development Officer			
District Magistrate (DM)			
General Manager (GM), zonal railways, Indian Railways			
General Manager (GM), state power corporation			
Road and Transport Department			
Division-level Rapid Response Team			
Range-Level Rapid Response Team			
Community-Level Primary Response Teams under the area of operation			

Tool 5: Infrastructure and equipment for managing HWC mitigation measures

S. no.	Item	Details
Cages for carnivores		
1	Trap cages	Number of cages per RRT to be decided on the basis of frequency of conflict incidences per week per site
2	Transportation box	Box should be blind from all sides, with holes for ventilation at appropriate height (size as per requirement of species and utility).
Cages for ungulates and other species		
3	Transportation crates	Box should be blind from all sides, with holes for ventilation at appropriate height (size as per requirement of species and utility).
4	Monkey crates	As per requirements.
5	Other crates	For birds, reptiles, etc.
Equipment and material		
6	Net	Net size 3 m × 3 m, gap size 2 inches × 2 inches, material for net preferably cotton or material used in drop net
7	Ropes (half inch width/gauge)	(A) Plastic/nylon rope—length 5 m, 2 nos. (B) Cotton rope—length 5 m, 2 nos. (C) Mountaineering rope—length 5 m, 2 nos.
8	Ropes of different sizes and gauges	Ten ropes of different lengths (2–10 m) and gauges (0.25- to 2-inch); One cotton rope of 0.5-inch gauge and 30 feet length.
9	Blindfold cloth	Linen or soft cotton cloth, length 2–3 feet, width 6–7 inches. Cloth must be fitted with Velcro on its ends for easy closure.
10	Rope ladder	Length 50–60 feet with bamboo paddle. Rope gauge should not be less than 2 inches.
11	Swiss knife with pliers	Knife should be checked for other attachments (pliers, size 8 inches).
12	Muzzles	Muzzle size should be according to the requirement of the species.
13	Multiple utility toolkit	A good quality toolkit with handy drill machine.
14	Auto-release catcher	Auto-release catcher
15	Auto-release snare pole	Auto-release snare pole
16	Snake tongs	Snake tongs should be available
17	Hanging balance	Capacity up to 100 kg
18	Straighter	Straighter
19	Belts	Nylon or rubber belts—width 3–4 inches and length 2–3 m
20	Spray bottle	Ten-litre spray bottle for cooling animals during hot and dry summers
21	Bungee cords with hooks	Bungee cords of different lengths with hooks for tying and securing purposes
22	Teflon tape	Without adhesive (for locking jaws of crocodylians)
23	Tents and sleeping bags	Lightweight tents and sleeping bags for two or three persons

S. no.	Item	Details
24	Winch	Capacity of up to 1 ton
25	Collapsible aluminium ladder	Collapsible aluminium ladder of bigger size fitted within vehicle
26	Reinforced work gloves	Reinforced, heavy-duty work gloves to provide grip on ropes
27	Baffle board	A ply board of size 2 feet × 3 feet and 2–3 mm gauge with holes for grip ropes
28	Stretchers for animals	Readymade or custom-made for specific species, for moving injured or immobilised animals
29	Stretchers for humans	For moving injured personnel
30	Poles, GI/MS pipe	2 inch diameter, length 2, 3 and 4 m, 6 to 10 nos.
31	Wireless set	Fitted in field vehicle; also two walkie-talkie sets
32	GPS	Available in parks and sanctuaries
33	Range finder	Available in parks and sanctuaries
34	Binoculars	Available in parks and sanctuaries
35	Still camera or video camera	As available
36	Utility boxes and tool boxes	One medium-/large-sized box that can hold the items listed in the next row
37	Items for utility box	<ul style="list-style-type: none"> a) Scissors (medium) b) Knife – 2 (one medium and one big ‘khukhari’ size) c) Bucket (15 l) with mug d) Pickaxe e) Spade f) Axe—small and medium g) ‘Sabbal’ (two—4 feet and 6 feet long—can also be used as leverage) h) Hammer—4 kg i) Hacksaw (portable handsaw)—size 8 inches, with extra blades j) Jerry can, 20 litre capacity k) Gunny bags/canvas bags, or canvas sheet 2 m × 2 m, 5 nos. l) Search light and torch (3 cells) m) Binding wire, 500 g n) Garden nylon pipe, 0.5-inch gauge, 20 feet o) Nut bolts (10 nos. of different sizes) p) Nails—500 g, of mixed sizes q) Tags (plastic) r) Needle (Suja and Sutli) for gunny bag packing s) Water bottle—2 litres, 5 nos. t) Towel, napkins u) Bed sheet v) Dhurries (to sit on or use as equipment to set up space) w) Cotton waste to keep equipment clean

S. no.	Item	Details
38	Clothing	For uniforms to identify RRTs: a) Dungarees of same colour b) Same-coloured camouflage jackets, or vests, with fluorescent markings c) Gamchha (thin big towels) d) Rubber gumboots e) Field boots or high-ankle hiking boots f) Same-coloured caps with visors
Chemical restraints		
First-aid box		
39	First-aid box for humans	As mentioned in Protocol 2.5.7
40	First-aid box for animals	First-aid box is obligatory. So we will have to prepare it with the items and medicines listed here. i) Tincture of iodine—200 ml ii) Tincture of benzoin—200 ml iii) Spirit—500 ml iv) Potassium permanganate powder—50 g v) Antiseptic cream (Topicure) vi) Dressing kit with large-size gauze dressing vii) Disposable hypodermic needles—18-inch, 25 nos. viii) Injectable solutions of: Ibuprofen—30 ml, 5 nos. Meloxicam—30 ml, 5 nos. Diazepam—30 ml, 5 nos. Xylazine—50 ml, 2 nos. Ketamine—50 ml, 2 nos. Yohimbine—50 ml, 5 nos. Sevite-E—2 nos. Dexona 30 ml—5 nos. Atropine—10 nos. Doxopram—5 nos. Epinephrine—5 nos. Tetanus toxoid—10 nos. Vitamin K (Cromostal) Long-acting antibiotic, 50 ml—5 nos. Aminophylline Atipamezole, 30 ml—5 nos. Calcium gluconate Dextrose 50% Diphenhydramine Naloxone Vasopressin Normal saline—10 bags ix) Trocar-cannula (to puncture belly)

S. no.	Item	Details
Darting equipment		
41	Blow pipe	Plastic or lightweight alloy blow pipe Blow pipe with all associated accessories 25 darts and needles—all categories for ungulates and carnivores
42	Immobilisation remote drug delivery system	11-mm barrel and additional 13-mm barrel
43	Vario syringes with stabilisers	i) 3 ml—25 to 50 nos. ii) 2 ml—20 nos. iii) 5 ml—10 nos. iv) Practice syringes—25 nos.
44	Vario and other needles	i) Elephant cannula—10 nos. ii) 1.5 mm × 30 mm—2 packets iii) 2.0 mm × 30 mm—4 packets iv) 2.0 mm × 40 mm—4 packets
45	De-venting pin	5 nos.
46	Syringe connectors	5 nos.
47	Silicone sleeves	Green and red—2 packets each
48	Silicone oil	2 vials
49	Distilled water	25–30 vials
50	CO ₂ cylinders	50–100 nos.
51	Safety caps for syringe	10 nos.
52	Foot pump with meter	1 no.
53	Drug delivery equipment case	Mostly supplied with the dart gun. If not, procure it.
54	Pencil box	To keep drug-filled syringe during field operations—4 nos.
55	Equipment case	Fishing tackle box to keep all chemicals/drugs and accessories of darting-related items. A separate box may be required for first-aid kits.
56	Mobile refrigerator	Small portable refrigerator for sample preservation—dual mode operation—electricity and vehicle
Vehicles for RRTs		
57	Main vehicle	This vehicle will keep all items, equipment and other accessories except the dart gun, gun-related accessories and drugs. This vehicle should have sitting space for four to six persons, excluding the driver.
58	Supporting vehicle	Scorpio-type AC vehicle—must have 4 × 4 options. All darting-related equipment and drugs will be carried in this vehicle.

Note: While every attempt has been made to include everything that a Rapid Response Team (RRT) might require to address HWC mitigation situations, this list may not be exhaustive, and teams are encouraged to add any other equipment they consider important for managing HWC mitigation activities at their sites.

Tool 7: Format (Form-1) for reporting an accidental spillage or exposure of biomedical or bio-hazard waste

- 1. Date and time of accident:
- 2. Type of accident:
- 3. Sequence of events leading to accident:
.....
- 4. Has the authority been informed immediately?
- 5. The type of waste involved in accident:
.....
- 6. Assessment of the effects of the accident on human health and the environment
.....
- 7. Emergency measures taken:
.....
.....
- 8. Steps taken to alleviate the effects of accidents:
.....
.....
- 9. Steps taken to prevent the recurrence of such an accident:
.....
.....
- 10. Does the facility has an emergency control policy? If yes, give details:
.....
.....

Date:

Signature.....

Place:

Designation

.....

Tool 9: Health assessment for persons involved in managing wild animals

All personnel who have contact with wild animals during HWC mitigation operations must fill this form!!

Name of the person _____ M/F _____ Age _____
Local address: _____
Permanent address: _____
Phone number: _____
Designation: _____

These answers are confidential and should be discussed directly with a health care provider. Answer Yes or No.

A. Nature and scope of work for HWC mitigation

B. Is animal husbandry an essential part of your duties (providing food/water, cleaning cages, grooming animals, etc.)?
Yes/No

Tick the following:

- No animal contact
- No direct contact, but enter animal facility
- Involved in restraint/handling of wild animals and conducted procedures on live animals and “unfixed” tissues and fluids.
- Handles, restrains, collects specimens or administers drugs to live animals.
- Performs invasive procedures such as surgeries and necropsies.

C. Does your work with animals require you to be in contact with agents that are infectious to humans (blood or other tissues from animals infected or contaminated with a pathogen)? List the agent(s).

D. Do you have known or suspected allergies to animals?

E. Do you have chronic health problems (diabetes, asthma, high blood pressure, etc.)?

F. Do you have renal or liver disease?

G. Do you have heart disease?

H. Do you have immune system deficiencies (or other medical conditions that may limit your ability to carry out your duties)?

I. Do you have pre-existing allergic tendencies (hay fever, eczema, cholinergic, latex, etc.)?

J. Do you work directly with the rabies virus or have direct contact with animals quarantined for rabies surveillance?

K. Will the work involve any of the following?

1. Biological agents
 - a. Recombinant DNA Yes/No
 - b. Infectious agents Yes/No
2. Human blood, tissues or cells Yes/No
3. Physical agents
 - a. Caustic material, flammables or cryoagents Yes/No
 - b. Noise Yes/No
 - c. Radiation Yes/No
 - d. Extreme environmental conditions Yes/No
4. Chemical agents
 - a. Anaesthetic gases Yes/No
 - b. Drugs/chemotherapeutic agents Yes/No

L. Have you been seriously ill or injured during the last 5 years? Provide a description:

M. Are you currently receiving medical treatment/counselling? Provide a description:

N. Do you take any medications routinely? Provide a description:

O. Record of vaccinations received (name of vaccine and date received):

Signature: _____ Date _____

Name: _____

6. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN INSTITUTIONAL AND POLICY FRAMEWORK ON HEALTH EMERGENCIES IN HWC SITUATIONS IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place by the DLCCs and SLCCs to document the feedback received from the implementation of these guidelines.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for fine-tuning health emergencies and addressing the long-term risk of zoonotic and other emerging diseases during an HWC and for understanding capacity needs for effectively

implementing the inter-agency coordination mechanism and taking a One Health approach.

- In the long term, the feedback may be consolidated and used in further revising/updating the capacity development strategies, Division-Level HWC Management Action Plans and National and State HWC Strategy and Action Plans.
- Feedback from the inter-agency teams will be used to further strengthen our understanding of the operationalisation of the One Health approach.

7. PROCESS OF DEVELOPMENT AND PILOT TESTING OF THESE GUIDELINES AND THE CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives from government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, public health experts, medical professionals, veterinary experts, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology^{8 9}. The experts had different roles in the drafting and editing process, viz., they were Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and Deutsche Gesellschaft für Internationale

Zusammenarbeit (GIZ) and independent wildlife and policy experts, was formed for the overall steering and facilitation of the process. The Working Group on Pilot Implementation of Guidelines and HWC-NAP was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal to review and finalise the guidelines.

8. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned

every 5 years, from 2023 onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- A detailed mechanism, templates and guidance for collating information and feedback related to the use of these guidelines may be developed.

⁸ Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

⁹ Human-Wildlife Conflict Mitigation Instrument- Strengthening Capacities to Address the issues related to zoonotic and other emerging diseases: Taking a One Health Approach <publication02-06-2022-1654169065.pdf> (indo-germanbiodiversity.com)

ANNEXE 1

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Ministry of Environment, Forest and Climate Change
Government of India
2023



Government of India



Guidelines for Crowd Management in Human–Wildlife Conflict–Related Situations

Taking a Harmonious–Coexistence Approach



Ministry of Environment, Forest
and Climate Change,
Government of India, 2023

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Ministry of Environment, Forest and Climate Change



Government of India



Guidelines for Crowd Management in Human–Wildlife Conflict–Related Situations

Taking a Harmonious–Coexistence Approach

Abbreviations

BMZ	German Federal Ministry for Economic Cooperation and Development	JFM	Joint forest management
CWLW	Chief Wildlife Warden	MoEFCC	Ministry of Environment, Forest and Climate Change
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct Benefit Transfer	NGO	Non-government organisation
DFO	Divisional Forest Officer	NHAI	National Highways Authority of India
ECG	Electrocardiogram	NTCA	National Tiger Conservation
EDC	Eco-Development Committee	NTFP	Non-timber forest product
EIA	Environment Impact Assessment	NTG	National Technical Group
EWRR	Early Warning and Rapid Response Team	NWAP	National Wildlife Action Plan
FD	Forest Department	OPs	Operating procedures
GIS	Geographical information system	PA	Protected area
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	PPE	Personal Protective Equipment
GSM	Global System for Mobile Communications	PRT	Primary Response Team
HWC	Human-wildlife conflict	PWD	Public Works Department
HWC-MAP	Human Wildlife Conflict Management Action Plan	RRT	Rapid Response Team
HWC-NAP	National Human Wildlife Conflict Mitigation Strategy and Action Plan	SDRF	State Disaster Response Force
HWC-SAP	State-level HWC Mitigation Strategy and Action Plan	SFD	State Forest Department
IUCN	International Union for Conservation of Nature	SHG	Self-help group
		UAV	Unmanned aerial vehicle
		VFC	Village Forest Committee
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

Abbreviations	iv
1. About The Guidelines	6
1.1 The Overall Context	6
1.2 Purpose and Scope	6
1.3 Approach	7
1.4 Legal and Policy Framework for Implementing the Guidelines	7
1.5 Institutional Mechanism for Implementing these Guidelines	7
2. Context and Situation	8
3. Planning for Crowd Management during HWC Situations	9
3.1 Threat, Vulnerability and Risk Assessment (TVRA)	9
3.2 Development of Crowd Management Plans by Each District	9
3.3 Planning of Communication and Emergency Operation Centre	10
3.4 Intra- and Inter-agency Coordination: Role of Various Stakeholders in Crowd Management	10
3.5 Facilitating Capacity Development of All Responders and Stakeholders	11
4. Prevention and Preparedness Measures	12
4.1 Overview	12
4.2 Prevention and Preparedness Framework	12
4.3 Containment Measures	12
5. Execution of Crowd Management Plan in Emergency Situations	14
5.1 Indicative Situations Where Crowd Management may be Required	14
5.2 Activation of District Plan in the Event of Occurrence of an Incident	14
5.3 Key Actions in Different Situations	14
6. Use of Learnings from the Guidelines to Further Strengthen Institutional and Policy Framework on Crowd Management in HWC Situations in India	15
7. Process of Development, Pilot Testing of These Guidelines and Consultation Process	15
8. Monitoring and evaluation of Guidelines	15
Annexe 1	16
National Technical Group (NTG)	16
Working Group on Pilot Implementation of Guidelines and HWC-NAP	16
Author Group for drafting the guidelines	16

1. ABOUT THE GUIDELINES

1.1 THE OVERALL CONTEXT

- These guidelines on ‘Crowd Management in Human-Wildlife Conflict related situations’ get the overall context from the Wildlife (Protection) Act 1972, advisory to deal with human-wildlife conflicts (HWC) (MoEFCC 2021) and the National Human-Wildlife Conflict Mitigation Strategy and Action Plan 2021 (HWC-NAP)¹. These guidelines take into consideration the existing policies, guidelines, advisories and good practices issued by the Government of India and various state governments in relation to crowd management.
- The advisory to deal with human-wildlife Conflicts (MoEFCC, 2021) recognizes that in HWC situations, dealing with a large number of people who quickly gather at one place to view wild animals or to prevent wild animals from entering their farms/habitations becomes a challenging task that hampers safe passage of wild animals or rescue work. The advisory recommends that state governments/UT administrations may review the situation, devise administrative mechanisms to ensure efficient coordination and cooperation of the law enforcing agencies to ensure the smooth handling of such situations. The advisory also highlights the fact that providing safe passage to the wild animals involved in HWC in human habitations is as important as taking care of the safety of the people present at the rescue site. This should be the topmost priority, and the local administration should ensure better crowd management during such circumstances.
- HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines. Specific supplementary frameworks to the HWC-NAP² provide further details on key issues.
- The following species-specific guidelines are to provide guidance on species-specific mitigation measures guidelines for mitigating human–Elephant, –Leopard, –Gaur, –snake, –crocodile, –Rhesus Macaque, –Wild Pig, –bear, –Blue Bull and –Blackbuck conflicts.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human-Wildlife Conflict Mitigation; and Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations: Taking a One Health Approach.

1.2 PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on what constitutes effective and efficient crowd management during HWC-related situations and provide a framework for inter-agency communication and coordination in related crowd management operations.
- These guidelines provide measures to prevent and mitigate the negative impacts on people, property and wild animals that may arise due to crowd-related incidents during HWC situations.
- These guidelines further provide details on the roles, responsibilities and joint tasks of key stakeholders for effectively mitigating and responding to crowd-related incidents during human-wildlife conflict situations.
- The guidelines are advisory in nature, and their purpose is to guide the management of crowds in HWC situations in a coordinated manner. The users of these guidelines, therefore, can use other methods or means –the ones most appropriate in their situation if a new situation arises that is beyond the existing scope of these guidelines, provided they are competent and trained to implement such measures.
- In general, the guidelines apply to all stakeholders relevant to crowd management in HWC mitigation operations and HWC mitigation measures including but not limited to various departments and agencies, viz., the district administration, state forest department, police, disaster management department, rural development department, Panchayati Raj Institutions, the railways, the agriculture, animal husbandry and urban development departments, municipalities, the health department and civil defence volunteers. These guidelines are meant to be used by the officers of SFDs for long-term planning.
- These guidelines may be translated into a district-level Emergency Response Plan by the district administration in the context of HWC situations.

1 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

2 Supplementary frameworks to the HWC-NAP: <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

1.3 APPROACH

- The development and implementation of these guidelines is driven by a harmonious- coexistence approach³ to ensure that both humans and wildlife are protected from negative impacts of human-wildlife conflict.
- The development of these guidelines and their intended implementation are driven by a participatory approach. These guidelines are intended to facilitate participatory planning, development and implementation of crowd management measures.
- While the overall planning and coordination of human-animal conflict mitigation operations will be the responsibility of the state forest department, all other concerned key departments and agencies participate in and support the operations and carry out their functional responsibilities in coordination with the forest department to implement these guidelines.
- Departments other than the forest department that are involved in crowd management during HWC mitigation operations are expected to provide feedback about the challenges faced during such interventions and about the gaps to be addressed before carrying out such operations in the future so that the necessary actions can be taken well in time.
- Taking a capacity development approach, the guidelines facilitate the implementation through provision of Implementer's Toolkit, which includes Operating Procedures (OPs), formats, checklists, and other field implementation aids.
- These guidelines may be provided to each forest range, RRT, PRT and police station at HWC hotspots and to the district administration, district disaster management authorities, panchayats, wildlife experts and other key stakeholders as mentioned in these guidelines.
- The guidelines may be translated into local languages by the respective SFDs for the field teams.

- The guidelines will be able to bring in the required effectiveness and efficiency in mitigation measures only when the guidelines are fully integrated into the division-level HWC Management Action Plans (HWC-MAP) and state-level HWC Mitigation Strategy and Action Plans (HWC-SAP) of the forest department and into the departmental plans of the police department, district administration, disaster management department and panchayats.

1.4 LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- The guidelines are developed in line with the existing legal framework and laws dealing with
 - the environment, biodiversity conservation and wildlife protection
 - prevention of cruelty to animals
 - crowd management
 - disaster management
- These guidelines may read in conjunction with the existing relevant legal and regulatory frameworks, especially the Wild Life (Protection) Act, 1972. The supplementary framework to HWC-NAP 'Legislative Framework for HWC Mitigation in India' may be referred to for more details on the specific legal provisions for HWC mitigation.
- In the country, there are standard legal provisions to regulate and manage crowds that have been put to use when handling situations involving the assembly/gathering of people in typical human-wildlife contexts as well. Effective crowd management in this context will involve coordinated action by the forest department, police personnel and the district administration in line with the powers vested in them under the various laws of the country.

1.5 INSTITUTIONAL MECHANISM FOR IMPLEMENTING THESE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP will followed for implementing these guidelines.

³ 'Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impact of human-wildlife interaction on humans or on their resources and on the wildlife or habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimizes conflict.

2. CONTEXT AND SITUATION

- Human–wildlife conflict (HWC) and its mitigation are complex, multi-dimensional and dynamic processes. Thus they require an integrated and holistic approach to finding solutions for prevention and mitigation.
- One of the critical areas of concern is the crowd-related incidents in HWC situations that are reported regularly from different parts of the country. There are various causes and triggers for the uncontrolled and retaliatory behaviour of the crowd gathered at the conflict site, including an element of curiosity and a limited understanding of the behaviour and ecology of wild animals. Crowd behaviour can be unpredictable. It can vary from displaying a curiosity to see large animals (to see mega-mammals) to demonstrating irresponsible behaviours (getting too close to wild animals to click pictures or shoot videos to cover such incidents) and very aggressive behaviours (frenzied mobs trying to lynch an animal in retaliation). Sometimes, the crowd is hostile and can even harm forest officials/property and wild animals, due to panic and stress, especially if there is human death or injury caused by the wild animal.
- Negative behaviour of a crowd/mob impacts the effectiveness of HWC mitigation measures. It can disturb/irritate the animal, which may result in the animal attacking the people in panic, resulting in human injury or even death. On the other hand, this may injure the wild animal or lead to severe stress to the animal. It can hamper rescue operations, especially if the wild animal is to be tranquilized. The animal is usually under severe stress in these situations, and additional stress poses further difficulties for the animal in coping with the drugs used to immobilize it chemically. The severe stress caused to the animal may hamper the induction process of immobilization and may disturb the tranquilization protocol. Sometimes the animal may also die due to shock or become more agitated during failed tranquilization efforts. In addition, situations of an uncontrolled or mismanaged crowd may lead to negative reporting by the media that highlights the situation of chaos and poor management.
- Crowd control continues to be a major challenge in HWC mitigation efforts, and therefore once the wild animal enters a human-dominated landscape, crowd control becomes the most important aspect to deal with. In such situations, where wild animals themselves feel insecure and threatened, their actions/reactions are largely as per their survival instincts. Prudent local community behaviour can avoid crowding and ensure that the human beings as well as the animal in conflict are safe. A quick and well-coordinated response from law enforcement agencies can address the issue of HWC and crowd control effectively. In the forest fringe areas with a high population pressure and conflicting social interests within the community, timely action can avoid any mishaps in the field.
- Effective crowd control and management is critical during HWC mitigation as it will allow the response teams to focus exclusively on their work and carry out the mitigation operation smoothly and efficiently. The immobilization and capture of the animal will be quick, and the possibility of stress in the animal will be minimized. Moreover, the media will also be able to cover the mitigation process properly without disturbing the rescue team or the wild animal.
- Depending upon the situation, the crowd behaviour and availability of resources, various measures are being implemented in different states/ locations, some of which have led to successful crowd control initiatives/endeavours. There are some good practices to indicate that sensitization of local communities and training of community volunteers in crowd control have assisted in minimising the impact of the conflict situation on the ground. However, effective crowd management in human–animal conflicts still remains a challenge for most of the situations in the country, primarily due to limited coordination between the forest department, police, district administration and other relevant stakeholders over role-clarity and standard response procedures, limited capacities among rescue team members and other stakeholders to manage such situations and non-existence of common agreed protocols among key stakeholders.

3. PLANNING FOR CROWD MANAGEMENT DURING HWC SITUATIONS

3.1 THREAT, VULNERABILITY AND RISK ASSESSMENT (TVRA)

Key actions under TVRA include:

- Identifying the kind of threats/risks related to crowd control in HWC situations
- Identifying the geographical areas/zones where the risk/threat of HWC exists
- Understanding the extent of resources (both human and material) available for dealing with such situations

Hazard zonation and mapping

- Preparation of standard criteria/framework for classification of risk-prone areas related to crowd control in HWC
- Classification of the risk-prone areas on the basis of the threat perception (including occurrence of past incidents)

3.2 DEVELOPMENT OF CROWD MANAGEMENT PLANS BY EACH DISTRICT

- The increasingly unpredictable behaviour of the wild animals during any conflict situation, coupled with the presence of a large crowd nearby, poses a grave danger not only to the animal and people but also reduces the efficiency of HWC mitigation response teams. The situation may also become volatile and grow into a law and order problem in the area. Therefore, crowd management measures are essential for directing or limiting the behaviour of groups of people through proper planning, multi-stakeholder support and inter-departmental coordination.
- Advance planning for crowd management and control for crowd-related HWC impacts can prevent avoidable losses. Considering that the principles of crowd management and control are common for all types of crowd, it will be effective to develop a common plan across key relevant sectors and stakeholders at the division/district levels to facilitate role-clarity and to facilitate knowledge and experience sharing.

- As there are differences between the jurisdictions of the district administration and forest division, it will be efficient to maintain institutions, viz., District-Level Coordination Committees, as the anchors for implementing these guidelines since a DLCC will be able to bring together the respective Divisional Forest Officers (DFOs) along with the district-level officials and personnel.

- It would be essential to formulate a comprehensive plan at the district level for dealing with crowd-related incidents in HWC situations. The plan may include the specific roles and responsibilities of each of the identified stakeholders and the key set of actions that need to be implemented, stakeholder-wise, for prompt responses and mitigation during such situations. This will in turn promote a multi-stakeholder-driven implementation approach and prompt sharing and deployment of resources available with different stakeholders such as the forest department, police, other emergency services and the district administration.

- To develop a holistic and inclusive crowd management and control plan, it is essential to adopt an integrated multi-risk and multi-stakeholder approach. This requires that the plans be developed with full coordination and cooperation amongst all the relevant stakeholders in the division/district. These plans may be aligned with and implemented in conjunction with the respective division-level HWC Management Action Plans.

- The plan will involve identifying various stakeholders and enhancing the capacities of the first responders and the specialist responders for rapid responses during crowd management, defining the roles and responsibilities of each stakeholder clearly and integrating each stakeholder into the national, state and district-level plans for seamless coordination and synergy.

3.3 PLANNING OF COMMUNICATION AND EMERGENCY OPERATION CENTRE

- This step involves setting up/integrating early warning and operational communication systems, emergency operation centres/control rooms, GIS-based monitoring systems, etc.
- Effective implementation of this step will lead to enhanced information gathering and analysis and timely dissemination of information.

3.4 INTRA- AND INTER-AGENCY COORDINATION: ROLE OF VARIOUS STAKEHOLDERS IN CROWD MANAGEMENT

- The management of any emergency is a core responsibility of the local administration; however, it is also a collective responsibility of various stakeholders affected by the incident. In an HWC crowd-related situation, the community plays a major role, and its integration in all stages of plan formulation and activation is essential. Clarity about the role of each of the stakeholders is a must to avoid confusion and mismanagement at the incidence site. These guidelines are a step forward to promote a well-coordinated multi-stakeholder engagement approach and a more standardised structure to the management of crowd-related HWC emergencies.
- A coordinated approach to emergency management planning will strengthen the capacity of the Government to prevent, protect against, respond to and recover from major crowd-related HWC emergencies. As per the MoEFCC advisory and HWC-NAP, a district-level HWC Coordination Committee (DLCC) may be established in all HWC hotspots, chaired by the District Magistrate/Collector/Deputy Commissioner. The DLCC will ensure inclusive coordinated action by key departments and agencies to ensure better crowd management, apart from performing other roles and responsibilities.
- The roles of the various stakeholders in crowd management may be clearly indicated in the detailed standard operating procedures (SOPs), and these may be agreed to by all the stakeholders. These roles may be in alignment with the roles and responsibilities of the DLCC as defined in the advisory and in the HWC-NAP.

- Similarly, the roles of the community-level Primary Response Teams, range-level Rapid Response Teams and division-level Rapid Response Teams may be defined, in line with the Supplementary Framework to the HWC-NAP on Establishment and Capacity Development of HWC Mitigation Response Teams.
- SOPs indicating the specific roles and responsibilities of the forest department officials, District Magistrate/administration, police department, fire department, emergency services (NDRF, SDRF, paramilitary forces), health department, animal husbandry department, relief/revenue Department; first responders, specialized responders and other volunteers may be laid down clearly.
- The police have a critical role to play in crowd management planning and implementation. The primary role of the police in such situations is law enforcement for crowd management and providing protection to the forest staff during rescue operations. The police also have a legal role to play in incidents involving human death in conflict situations. In cases of wild animals entering human-dominated landscapes, sometimes the police department is the first responder due to their wide communication network.
- The fire brigade have tools and skilled manpower that may be useful in some emergency situations.
- SDRF/NDRF have human resources, equipment and the capacity to help in emergency situations.
- In places where paramilitary forces are stationed, they may assist with maintaining law and order and may also support the forest staff with patrolling and maintaining a vigil as well as with the rescue operations.
- The support of the health department is required in cases where individuals are critically injured and require priority attention.
- The forest department has a limited number of veterinary doctors deputed in various protected areas (PA) and zoos, and at times they may not be immediately available. In such situations, the services of veterinary doctors serving at the animal husbandry department would be helpful. Therefore, building the capacity of veterinarians working in the animal husbandry departments for managing HWC mitigation operations is also very important.
- Involvement of state and local training institutions for sustaining the training efforts and bringing innovation in the training initiatives is a central role to ensure effective coordination and capacity development of key stakeholders.

- Augmenting the HWC mitigation efforts through public-private partnerships will be desirable. Engagement of resources such as NGOs, religious groups, CSOs, RWAs and PRIs/Village Committees may be planned for community development, specialised training programmes and operational engagements.

3.5 FACILITATING CAPACITY DEVELOPMENT OF ALL RESPONDERS AND STAKEHOLDERS

Capacity need assessment based on competency framework

- The relevant competencies development needs may be discussed at state-, landscape- and district-level fora, as recommended in the advisory from MoEFCC and HWC-NAP, including the state-level coordination committee, landscape-level HWC Mitigation Forum and District-Level Coordination Committee (DLCC)
- An annual plan of joint training programmes focusing on crowd management competencies may be prepared in each district.

Strengthening the system of training programmes and other capacity development measures for inter-agency cooperation

- It would be essential to establish, train and equip the first responders, specialist responders, community-level Primary Response Teams and other stakeholders for crowd management and other identified threats.
- Crowd control and management in HWC situations may be suitably integrated into the training curricula and training plans of state- and district-level training institutes.

Sensitization, awareness and training interventions

- Joint training sessions on crowd control and management strategies may be organised for decision-makers and senior administrators by the district administrations
- Basic training in crowd control and management (CCM) strategies may be organized for the local community at HWC hotspots by the zila panchayats as part of their regular training plans, with technical support from the police and forest department.

- Sensitization and awareness measures may be implemented together by the forest and police departments. Awareness programmes may be developed in and around the targeted areas. It would be essential to sensitize and educate all relevant stakeholders on the behaviour and ecology of wild animals to ensure that their own behaviour during an HWC mitigation-related situation is appropriately aligned with the safety requirements. Awareness measures may also focus on providing information on legal provisions related to wildlife, especially the legal penalties arising out of driving away/teasing such wild animals, apart from the penalties related to section 144 of CrPC.

- It may be essential to sensitize the media fraternity/stakeholders on the do's and don'ts of crowd management and control during HWC situations.

Competencies-development of the response teams and field personnel

- Joint simulation and mock exercises in crowd control in HWC may be held at regular intervals for forest officials with other stakeholders.
- Training of personnel: refresher training programmes may be organised at a frequency adapted to the district-level HWC situation.
- Joint inter-agency training sessions in crowd management in each district in an HWC hotspot may be organised periodically.
- Such training programmes may be integrated into the state- and district-level training institutes of Panchayati Raj Institutions, the forest department, the disaster management department, the police, the district administration, etc. to ensure that the training programmes are implemented on a regular basis and all the stakeholders receive the required competency-development training.
- Recognition/acknowledgment of efforts may be an integral part of capacity development efforts to secure the overall motivation of the response teams and other key stakeholders.

4. PREVENTION AND PREPAREDNESS MEASURES

4.1 OVERVIEW

- 'Prevention measures' refer to the set of actions/measures carried out to eliminate or minimize the probability of occurrence of crowd-related incidents in human-wildlife conflict situations.
- 'Preparedness measures' refer to the set of actions/measures carried out to be able to control crowd-related incidents effectively in HWC situations.

4.2 PREVENTION AND PREPAREDNESS FRAMEWORK

Surveillance

- Monitoring and surveillance by Rapid Response Teams (RRTs) (equipping them with appropriate public address systems) at regular intervals of forest department, supported by the community-level Primary Response Teams (PRTs) will assist with quick tracking and reporting of any crowd-related incident. The constitution of such teams and standard operating procedures (SOPs) for activation of such surveillance may be formulated in detail.
- Information about the movements of animals in conflict and the exact timing and venue of the planned capture site may only be shared with the concerned people/staff/officials.
- Enhanced public address systems may be made available for RRTs and community PRTs.
- Identification and sanitation of safe passages and alternative routes may be worked out.
- Leveraging local knowledge to track animal movements may be included in the preparedness phase.
- Identification of various exit routes and formulation of an exit plan may be undertaken in the case of any situation of uncontrolled/aggressive crowds.
- Drones could be used as part of the surveillance mechanism.

Deployment of effective barriers

- Natural barriers (rivers/small streams, lakes, hills, thick bushes, etc.) may be identified.
- Wherever necessary, structural barriers (fences, barbed wire, gates, any type of construction that prohibits or prevents access) may be used.
- It would be better to cordon off the conflict area before carrying out the response operation.

Use of equipment

- A check list may be prepared for the equipment and other resources required for suitable responses at incident sites (including equipment used for monitoring the status at the incident site and nearby), and a logbook may be maintained in this regard.
- Regular cleaning and/or inspection of the equipment, drugs and other consumables are necessary to maintain them in the functional mode.
- After inspection, faulty/malfunctioned equipment may either be discarded or repaired. Otherwise, it might be the cause for a misadventure during future response operations.
- The availability of enough accessories for the equipment may be thoroughly checked, and expired or damaged ones may be discarded.
- The functionality and accuracy of the critical health monitoring devices may be thoroughly checked to ensure timely management of any health complications of the captured wild animal.
- Modern forms of technology such as radio and satellite telemetry, GIS and Unmanned Aerial Vehicles (drones) may be deployed for tracking and better monitoring of wildlife.
- A specialised training programme in the use and maintenance of equipment may be conducted before every potential crowd management incident.

4.3 CONTAINMENT MEASURES

Crowd management intervention and control strategies

- Crowd management may be integrated into state and district action plans for human-animal conflict.
- Crowd management in HWC situations may be integrated into the state and district disaster management plans. (The criteria for the threshold/magnitude of the incident may be detailed.)
- Standard operating procedures (SOPs) may be formulated for identified crowd-related incidents.
- Crowd management coordination may be part of the review of ongoing stakeholder meetings at the forest department and district administration.

Reporting and documentation

At the end of the response operation, a detailed incident response report may be made that includes the following:

- Execution details: Step-wise details of information flow, response actions taken (including tasks performed by stakeholders) and challenges faced
- Further insights into the conflict and its future management
- Key follow-up actions that need to be taken, if any, to resolve the issue (incident)

Media engagement

- The forest department, with representation from the district administration, police and other related emergency services, may regularly hold interactions with the media (especially joint press briefings) to foster better understanding about issues pertaining to crowd control and management in HWC situations in the event of the occurrence of any such incident.
- Interactions with the media may be aimed at shifting from “sensationalizing” to a sensitization approach. Press conferences may be periodically organized to disseminate key messages on the efforts being made by the forest department and other stakeholders to tackle matters related to crowd management in HWC situations.

- From time to time, it may be useful to send short press releases about ongoing work to keep the media positively engaged. Efforts may also be made to engage with the media through social media (WhatsApp, Twitter, Facebook, etc.).
- Calls from the media may be responded to during crowd-related incidents, and as far as possible, the media may be kept informed of developments so that biased/counterproductive narratives are not disseminated to the public.
- Media workshops may also be organised that provide a useful platform for media professionals, forest officials and other stakeholders for interacting on issues of this nature in greater depth, leading to factual reporting of such incidents in the future.

“The Guidelines for Cooperation between the Forest and Media Sector in India” may be referred for details when interacting with the media personnel.

5. EXECUTION OF CROWD MANAGEMENT PLAN IN EMERGENCY SITUATIONS

5.1 INDICATIVE SITUATIONS WHERE CROWD MANAGEMENT MAY BE REQUIRED

- A person is killed outside the forest/protected area by a wild animal in an HWC incident, and when attending the case, forest officials are either attacked or their vehicle is damaged/burnt by unruly mob.
- A wild animal is electrocuted/shot dead/killed outside a forest/protected area in an HWC-related incident, and while taking action against the accused/booking the case, forest officials are attacked by a crowd.
- In forest fringe areas, where there are incidents of human/cattle killings, there is some delay in capturing the wild animal involved, and a crowd targets officials/properties of the forest department.
- When a wild animal involved in a human killing is captured and is being shifted to a rescue centre, a crowd tries to harm it.
- Protests are organised against the HWC incidents, and they turn unruly/violent.
- When crop-raiding wild animals are driven by forest officials/response teams, a local crowd swells up and endangers the safety of everyone.
- Due to an HWC issues, there is retributive action of a crowd in the forest fringe area on a wild animal and the forest department.

5.2 ACTIVATION OF DISTRICT PLAN IN THE EVENT OF OCCURRENCE OF AN INCIDENT

- As soon as the first information on the occurrence of a crowd-related incident is received by the designated forest officials, the district plan on crowd management may be activated and response actions may get initiated in accordance with the SOPs as mentioned in the plan.
- Key actions may include prompt dissemination of information to concerned stakeholders; activation of response teams at various levels; joint stakeholder (forest, police, district administration, etc.) deliberations/meetings to address the issue in the most effective manner; deployment of rescue teams, equipment and other resources for on-site operations; and suitable response actions undertaken as per the nature and type of incident. These may lead to effective and prompt crowd control at the site.

5.3 KEY ACTIONS IN DIFFERENT SITUATIONS

- Creating security cordon at the incident site
- Maintenance of public order and tranquillity: During the HWC scenario, it is very essential to maintain public order and tranquillity through effective crowd management. Therefore dispersal of unlawful assemblies and public nuisances (including urgent cases of nuisance or apprehended danger) is important.
- Dispersal of unlawful assembly: A capturing and rescue operation will take some time. Till then, crowd management and the safety of the wild animal as well as of the concerned officials will remain a challenge. Curious onlookers can be controlled with some effort, but to deal with the hostile crowd, stringent measures and trained force will be needed.
- Use of chemical immobilisation (forest, veterinary and animal husbandry departments)
- A transportation and traffic management plan may be developed together with the police, the fire department and allied emergency services.
- Plans for administration of first aid and handling medical emergencies at the incident site may be developed together with the health department/nearby hospitals.
- In case of any conflict situation, a system to ensure that the public can get information on helplines and related communication channels, requiring the support of the SFD, is established.
- The role of the media. before, during and after HWC situations may be discussed to ensure they participate effectively in crowd management.
- Adequate arrangements may be made to provide first aid to the person facing a health emergency condition, and then his/her quick transfer to the nearest available equipped hospital may be facilitated.
- All the team members may be given mandatory basic life support training, including CPR. Availability of a well-equipped ambulance with an oxygen supply, defibrillator, etc. and a trained nurse/medical officer (MO) may be available near the incident site.
- A well-equipped animal ambulance with a stretcher, critical health monitoring devices (pulse-oximeter, capnograph, blood gas analyser, multi-parameter monitor with B.P. cuff, etc.), an oxygen supply, life-saving drugs, etc. may be parked near the incident site. The Guidelines on Occupational Health and Safety as well as Health Emergencies may be referred to for further details on the foregoing.

6. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN INSTITUTIONAL AND POLICY FRAMEWORK ON CROWD MANAGEMENT IN HWC SITUATIONS IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place to document the feedback on them.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for finetuning

these mitigation measures and for understanding the capacity needs for effectively implementing the mitigation measures.

- In the long term, the consolidated feedback may also be used in further reviewing the capacity development strategies, HWC-MAPs, HWC-SAPs and HWC-NAP.

7. PROCESS OF DEVELOPMENT, PILOT TESTING OF THESE GUIDELINES AND CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives from Government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, policy experts and capacity development experts.

- A common understanding was developed on the overall purpose, scope, approach and methodology⁴. The experts had different roles in the drafting and editing process, viz., Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and independent wildlife and

policy experts, was formed for the overall steering and facilitation of the process. A 'Working Group on Pilot Implementation of Guidelines and HWC-NAP' was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human-Wildlife Conflict Mitigation.

- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A Committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC, and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal to review and finalize the guidelines.

8. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned to take place every 5 years

from 2023 onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.

- Detailed mechanism, templates and guidance used for collating information and feedback on the use of these guidelines may be developed.

4 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

ANNEXE 1

NATIONAL TECHNICAL GROUP (NTG)

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Ministry of Environment, Forest and Climate Change
Government of India
2023



National Centre for Disease Control



Government of India



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Forest and Climate Change,
Government of India

Guidelines for Addressing Health Emergencies and Potential Health Risks Arising Out of Human-Wildlife Conflict Situations

Taking a One Health Approach



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Government of India

Guidelines for Addressing Health Emergencies and Potential Health Risks Arising Out of Human–Wildlife Conflict Situations

Taking a One Health Approach

Abbreviations

ASHA	Accredited social health activist	IFS	Indian Forest Service
AWW	Anganwadi worker	IUCN	International Union for Conservation of Nature
BMZ	German Federal Ministry for Economic Cooperation and Development	JFM	Joint Forest Management
CPR	Cardiopulmonary resuscitation	MoEF&CC	Ministry of Environment, Forest and Climate Change, Government of India
CCTV	Closed-circuit television	MoHFW	Ministry of Health & Family Welfare
CWLW	Chief Wildlife Warden	NCDC	National Centre for Disease Control
CZA	Central Zoo Authority	NDRF	National Disaster Response Force
DBT	Direct benefit transfer	NGO	Non-governmental organisation
DFO	Divisional Forest Officer	NTCA	National Tiger Conservation Authority
DLCC	District-Level Coordination Committee	NTG	National Technical Group
EDC	Eco-development Committee	NWAP	National Wildlife Action Plan
EIA	Environmental impact assessment	OPs	Operating procedures
EWRR	Early Warning and Rapid Response	PA	Protected area
GIS	Geographical information system	PCCF	Principal Chief Conservator of Forests
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit	PPE	Personal protective equipment
Gol	Government of India	PRT	Primary Response Team
HOFF	Head of Forest Force (in a state)	RFID	Radio frequency identification
HWC	Human-wildlife conflict	RRT	Rapid Response Team
HWC-MAP	Human-Wildlife Conflict Management Action Plan	SDRF	State Disaster Response Force
HWC-NAP	National Human-Wildlife Conflict Mitigation Strategy and Action Plan	SFD	State forest department
HWC-SAP	State-Level HWC Mitigation Strategy and Action Plan	SHG	Self-help group
IDSP	Integrated Disease Surveillance Programme	SLCC	State-Level Coordination Committee
		SOPs	Standard operating procedures
		WII	Wildlife Institute of India
		WLPA	Wild Life (Protection) Act, 1972

Contents

1. About the Guidelines	2
1.1. The overall context	2
1.2. Purpose and scope	2
1.3. Approach	3
1.4. Legal and policy framework for implementing the guidelines	3
1.5. Institutional framework for implementing the guidelines	3
2. Context and Situation	4
3. Addressing Health Emergencies in Humans	5
3.1. Identification of health emergencies	5
3.2. Addressing health emergencies	5
3.3. Ensuring long-term emotional well-being of humans	7
4. Addressing Wildlife Health Emergencies	8
4.1. Identification of wildlife health emergencies	8
4.2. Addressing wildlife health emergencies on-site	8
4.3. Addressing veterinary health emergencies during transportation	8
4.4. Addressing veterinary health emergencies at rescue/veterinary healthcare centre/off-site	8
4.5. Addressing untreatable wildlife health conditions	9
4.6. Documentation	
5. Addressing Veterinary Emergencies in Domestic Animals	10
5.1. Identification of health emergencies	10
5.2. Addressing health emergencies	10
5.3. Documentation	11
6. Taking a One Health Approach	12
6.1. Overview of One Health approach	12
6.2. Key stakeholders	12
6.3. Key measures to be implemented to operationalise the One Health approach	12
7. Competency-Development of Personnel Responsible for Health Emergencies	13
8. Media Engagement	14
9. Use of Technology	14
10. Ethical Considerations	14
11. Use of Learnings from the Guidelines to Further Strengthen Institutional and Policy Framework on Health Emergencies in HWC Situations in India	15
12. Process of Development and Pilot Testing of These Guidelines and the Consultation Process	15
13. Monitoring and Evaluation of Guidelines	16
Annexe 1	17
National Technical Group (NTG)	18
Working Group on Pilot Implementation of Guidelines and HWC-NAP	18
Author Group for drafting the guidelines	18

1. ABOUT THE GUIDELINES

1.1. THE OVERALL CONTEXT

- These guidelines on 'Addressing Health Emergencies and Potential Health Risks Arising Out of Human-Wildlife Conflict Situations: Taking a One Health Approach' get the overall context from the Wild Life (Protection) Act, 1972, National Wildlife Action Plan (2017-31)¹ and National Human-Wildlife Conflict Mitigation Strategy and Action Plan (HWC-NAP) (2021-26)². HWC-NAP provides the overall conceptual and institutional framework for implementing the guidelines. This document takes into consideration the existing policies, guidelines, advisories and good practices issued by the Government of India and various state governments related to health emergencies and potential health risks arising out of human-wildlife conflict (HWC) situations.
- These guidelines take into consideration the advisory to deal with human-wildlife conflicts (MoEFCC, 2021), which seeks expedited inter-departmental coordinated and effective action by state governments/UT administrations to prevent and deal with HWC and associated death/injury/permanent incapacitation of human beings/domestic animals/livestock due to attack by wild animals or loss of crops and property as well as accidental deaths of wild animals listed in schedules I-IV of the Wild Life (Protection) Act, 1972.
- These guidelines take into consideration the 'National One Health Programme for Prevention and Control of Zoonotic Diseases' being implemented by the Ministry of Health & Family Welfare (MoHFW), Government of India in coordination with the Ministry of Fisheries, Animal Husbandry and Dairying and the Ministry of Agriculture.
- The following guidelines on cross-cutting issues are to provide guidance on selected issues: Guidelines for Cooperation between the Forest and Media sector in India: Towards effective communication on Human-Wildlife Conflict Mitigation; Occupational Health and Safety in the Context of Human-Wildlife Conflict Mitigation; and Crowd Management in Human-Wildlife Conflict Related Situations.

- The following guidelines are to provide guidance on selected species: guidelines for mitigating human-Leopard, -Elephant, -Gaur, -Crocodile, -Wild Pig, -Bear, -Blue Bull, -Rhesus Macaque, -Snakes and -Blackbuck conflicts.

1.2. PURPOSE AND SCOPE

- The guidelines aim to facilitate a common understanding among key stakeholders on the measures and protocols to be implemented to address health emergencies arising out of human and animal injury during human-wildlife conflict-related situations and to address situations of potential health risks for humans, wildlife and domestic animals, taking a One Health approach.³
- These guidelines provide measures to prevent and mitigate the negative impacts on people, domestic animals and wild animals that may arise due to health emergencies during HWC-related emergencies or during HWC mitigation operations.
- The guidelines serve as a basis for overall long-term planning and coordination of measures at the national, state and division levels.
- In general, the guidelines apply to all stakeholders relevant to addressing health emergencies and One Health and are not limited to the state forest departments.
- The guidelines will be able to bring in more effectiveness and efficiency when they are fully integrated into the Division-Level HWC Management Action Plans (HWC-MAP) and State-Level HWC Mitigation Strategy and Action Plans (HWC-SAP) and in the implementation plans of the National One Health Programme for Prevention and Control of Zoonotic Diseases' being implemented by the Ministry of Health & Family Welfare (MoHFW).

1 MoEF&CC (2017). National Wildlife Action Plan (2017-35)

2 National HWC Mitigation Strategy and Action Plan of India (2021-26), available from <https://moef.gov.in/wp-content/uploads/2022/01/National-Human-Wildlife-Conflict-Mitigation-Strategy-and-Action-Plan-of-India-2.pdf>

3 One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

1.3. APPROACH

- The development and implementation of these guidelines is driven by a harmonious- coexistence⁴ approach to ensure that both humans and animals are protected from negative impacts of HWC.
- While the overall planning and coordination of human–animal conflict mitigation operations will be the responsibility of the state forest department, all other concerned key departments and agencies participate in and support the operations and carry out their functional responsibilities in coordination with the forest department to implement these guidelines.
- The guidelines address the issue of health, adopting a holistic approach.
- These guidelines may be provided to each forest range, RRT, PRT, district administration, police station at a HWC hotspot, hospital, district disaster management authority, panchayat and wildlife expert and to other key stakeholders as mentioned in these guidelines.
- The documents may be translated into the local language for the field teams. Specific elements such as checklists, especially those needed for emergency response situations, may be printed in large-size posters and placed prominently on the walls of the HWC Mitigation Hubs and in similar control rooms of other stakeholders such as the police, district administration, hospitals, accredited social health activists (ASHAs) and anganwadi workers (AWW).

1.4. LEGAL AND POLICY FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

These guidelines may be read in conjunction with the existing relevant legal and regulatory frameworks. Also, any change in the legal provisions would require revisiting the guidelines. Refer to the supplementary framework of the HWC-NAP for more details on the specific legal provisions for HWC mitigation.

1.5. INSTITUTIONAL FRAMEWORK FOR IMPLEMENTING THE GUIDELINES

- The institutional mechanism outlined in the HWC-NAP may be followed for implementing these guidelines.
- Implementation of these guidelines will be anchored in each district at the District-Level Coordination Committee (DLCC), chaired by the respective District Collector, where the system of regular feedback and fine-tuning of the protocols and processes will be done to customise these to suit the local conditions.
- An effective coordination with the institutions responsible for implementing the 'National One Health Programme for Prevention and Control of Zoonotic Diseases' being implemented by the Ministry of Health & Family Welfare (MoHFW), Government of India, may further strengthen the implementation feasibility of these guidelines.

⁴ Harmonious coexistence' is defined as a dynamic but sustainable state in which humans and wildlife adapt to living in shared landscapes, with minimum negative impacts of human-wildlife interaction on humans or on their resources and on the wildlife or on their habitats. The mitigation measures designed using this approach maintain a balance between the welfare of animals and that of humans in which both are given equal importance. Overlap in space and resource use is managed in a manner that minimises conflict.

2. CONTEXT AND SITUATION

- Over 30 new infectious diseases have been detected globally in the last three decades, around two thirds of which were zoonotic in origin. There is an ever-increasing interface between animals and humans primarily due to habitat fragmentation and loss, the global trade in wildlife and increasing demands of ecotourism and other forest-dependent livelihoods. This has led to growing numbers of people and livestock in close proximity with wildlife, resulting in disease spill-over. This situation has a potential to grow out of proportion, and the resulting health risks can undermine the conservation and development efforts in such areas.
- The present situation and associated socio-economic and ecological impacts need to be urgently addressed keeping in mind that human, animal and ecological health are inter-connected—One Health. The One Health concept is based on the understanding that human, animal, and environmental health are closely interconnected and interdependent.
- One Health is a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.
- Indicative situations during health emergencies in HWC mitigation measures where risk of zoonotic and other emerging diseases are high include animal capture and translocation, treatment of injured animals, post-mortems and close wildlife–domestic animal–humans contact.
- So far, measures to address the health emergencies for humans, wildlife and domestic animals are being implemented by the public health, wildlife-veterinary and animal husbandry sectors in their respective work programme and using their separate channels, with the exception of the wildlife and veterinary sectors working together for protected areas.
- To effectively address and manage health emergencies during HWC mitigation and to operationalise a One Health approach to ensure the well-being of humans, animals and the environment, a coordinated effort of wildlife, veterinary and public health is required at the local level, bringing together field teams from these sectors, with the overarching cooperation with the district administration, rural development department.
- The Ministry of Health has been implementing the ‘National One Health Programme for Prevention and Control of Zoonotic Diseases’ since the 12th Five-Year Plan in coordination with the Ministry of Fisheries, Animal Husbandry and Dairying and the Ministry of Agriculture. Under the programme, various initiatives are being undertaken, including capacity building of medical, veterinary and wildlife professionals, laboratory strengthening for diagnosis of zoonotic diseases in humans and animals and creating community awareness. State-level zoonosis committees comprising the human, animal and wildlife sectors have already been constituted in 34 states.
- These guidelines will further strengthen the ongoing efforts by providing specific advice on addressing health emergencies arising due to HWC situations and taking a One Health approach in all measures relevant to HWC mitigation.

3. ADDRESSING HEALTH EMERGENCIES IN HUMANS

3.1. IDENTIFICATION OF HEALTH EMERGENCIES

The frontline staffs (both regular and contractual) of forest departments and the staffs of other relevant departments and institutions (e.g., the district administration, the police) can often find themselves in situations where they may be harmed.

- This may occur during patrolling, where they may be unexpectedly confronted by a wild animal or even during wildlife rescues or other HWC mitigation operations. Often, they are the first on call to manage conflict situations, where they may be injured by an alarmed animal that they are trying to rescue.
- They may also be attacked by a mob that may be reacting to the death or injury caused to humans by a wild animal that may have inadvertently strayed into a habitation.
- It is not very uncommon for members of the frontline staff to be electrocuted by an illegal electric fence set up by local farmers to protect their crops from wild animals.

3.2. ADDRESSING HEALTH EMERGENCIES

Emergency situations may need to be addressed at different levels, i.e., on site treatment through first aid and then possible transfer to local hospitals and in case of special needs/seriousness of injuries-advanced specialised hospitals.

- Operating procedures may be laid down in each forest division/district in line with these guidelines and in line with the institutional framework suggested under the HWC-NAP to ensure timely coordination amongst the various response teams from the forest department and other agencies, under the DLCC, consisting of the District Magistrate/District Collector, the police, the fire services, the Animal Husbandry Department, the Health Department, the SDRF, the Agriculture Department, the Department of Rural Development and Panchayati Raj, paramilitary forces, and other key relevant departments and agencies, and the local community-based institutions, especially panchayat leaders, community PRTs, ASHAs, anganwadi workers and para-veterinarians.

3.2.1. On-site

- The state forest departments may need to develop operating procedures for facilitating inter-agency coordination for such situations.
- Staff members of the state forest department who are trained in administering first aid, basic life support training and basic emergency support may be deployed.
- Fully equipped first aid kit that is constantly refilled/replenished with required medicines and other important items
- Fully equipped ambulance with oxygen supply
- Relevant medicines/anti-allergics/antidotes—anti-venom, burn treatment, slings, stretchers, etc.
- Ready budget for meeting emergencies/quick local purchases of medicines/services
- Directory of contact numbers of nearby healthcare centres

3.2.2. Special case of addressing medical emergencies during crowd management (including mass casualties)

Any crowd-related incident in a typical HWC situation will manifest into two kinds of medical emergencies from a human health standpoint, which include human mortality and physical trauma injuries. The cause of human deaths and trauma injuries in such situations is mainly attributed to the following:

- A stampede as a result of the gathering of large numbers of people at or in the vicinity of the incident spot.
- An assault by an unruly crowd on the animal, resulting in the animal attacking and injuring the crowd.
- Animal/animals at the incident spot (who have not been provoked) initiating an attack/assault on bystanders/watching crowd.
- Use of force to disperse or control a crowd that is gathering.
- Accidental firing of arms.
- Panic attacks to people who are claustrophobic.

The following measures may be implemented to minimise human deaths and injuries:

- The designate Medical Response Teams on-site (trained health personnel/Health Department) may activate the first aid and medical response plan and initiate primary first aid/treatment procedures for the injured people at the incident site.
- The designate response team for crowd control on-site (police and emergency services) may escort uninjured people to safer havens/areas.
- The designate Veterinary/Response Teams (veterinary and forest) on-site may control the movement of the animal/animals by effective tranquilisation and capture procedures in order to contain further injury to people.
- The Rapid Response Teams under the Integrated Disease Surveillance Programme (IDSP) of the Ministry of Health & Family Welfare, Government of India is mandated to investigate the outbreak and response for all Infectious diseases, including zoonotic diseases. These RRTs comprise a multi-disciplinary team including veterinarians and wildlife officers. Therefore, activities for the SFD RRTs and IDSP RRTs may be synergized for enhanced efficiency and effectiveness.
- The triage protocol, especially in a mass casualty situation like a stampede, may be immediately deployed by trained personnel of the Quick Medical Response Teams/ Designated Health/Medical Teams on-site to facilitate prompt segregation of people with minor and major trauma injuries.
- Depending on the nature of the physical injury, first aid and basic life support, including cardiopulmonary resuscitation (CPR)), may be administered to the injured people by trained and authorized personnel.
- People with major injuries and life-threatening conditions may be immediately transferred in an ambulance and other support vehicles to the nearest health/hospital facility. Traffic management may be coordinated in a manner to facilitate speedy transport of injured people to the nearest health/hospital facility.
- Dead bodies may also be transported to the nearest health/hospital facilities according to the protocol laid for the same.
- Each of the injured persons (who have received first aid/with minor injuries) may be taken to the nearest equipped health/hospital facility for an overall health

check-up to rule out any health issue/risk arising from the injury.

For this, it would be essential to:

- Activate the District Crowd Management Plan and take necessary actions in line with the Standard Operating Procedures as detailed in the Plan, especially in terms of intra- and inter-agency communication and coordination, transportation and traffic and medical management procedures.
- Coordinate with the state-level zoonosis committee (formed in 34 states in India) and Regional Coordinators (12 medical/veterinary institutes) for additional support and for avoiding duplication of resources and measures.
- Coordinate with the Rapid Response Teams under the IDSP, of the Ministry of Health & Family Welfare, Government of India, which are mandated to investigate the outbreak and response for all Infectious diseases, including zoonotic Diseases. The IDSP RRTs are composed of a multi-disciplinary team including veterinarians and wildlife officers. Therefore, effective coordination between the RRTs of the state forest departments and RRTs established under the IDSP may be strengthened.

The *Implementer's Tool Kit* may further provide clarity on the roles, responsibilities and set of actions to be implemented by each of the designated response teams for various preparedness, capacity development and response measures for handling such situations on the ground.

3.2.3. During transportation

Emergency medical transportation and evacuation are always unexpected and need spontaneous and speedy responses at the desired time.

- The ideal transportation and evacuation may be carried out within minutes or in the shortest possible time so that the injured person can be treated in the 'Golden Hour'. For this, it would be essential to activate the evacuation and transportation plan as detailed in the district crowd management plan. This plan may have identified routes, types of ambulances and support vehicles available at different levels with a resource inventory of paramedics, health personnel, quick medical response teams (QRMTs) and drivers.
- Each designated ambulance may have basic medical equipment for resuscitation, two-way communication devices, stretchers and essential

drugs. The support staff of the ambulance may be competent to use of the equipment available in the ambulance. SOPs for regular maintenance of the ambulance and its medical equipment may be laid down.

- Strict implementation of traffic rules and traffic management may be prioritised during such situations to prevent casualties on account of delays on congested roads.
- An adequate mechanism to prioritise the transport of critically injured persons by aerial evacuation and designated air ambulances may be developed as well.
- An inventory may be maintained for all emergency evacuation services, emergency medical personnel and paramedics.
- Emergency medical evacuation procedures may be appropriately rehearsed in the various inter-agency mock drills conducted for handling any HWC incident.

3.2.4. Off-site (support that can be provided to victims)

- Financial responsibility for treatment
- Medical treatment at hospitals—there may be tie-ups with local hospitals
- Tapping NGO schemes, if available, for (a) treatments at super-speciality hospitals for critical situations (severe burns, frostbite, disfigurement needing plastic surgery, organ transplants, etc.), (b) for meeting treatment costs at local hospitals and (c) for ex gratia support to nominees in case of death of staff members
- Counselling and psychological support in case of severe trauma and psychological problems that may arise from strenuous field conditions (remote locations, etc.) and challenging field circumstances (fighting forest fires, occasional violent/dangerous confrontations with wildlife, etc.)

3.2.5. Documentation of ex-gratia payments, if provided

- Official request letter to DFO/Field Director, etc. from ranges/beats/compartments
- Data on name: name, designation of staff member, date of birth, date, time and location of incident, brief description of incident, action taken (local treatment or treatment at local hospital/health centre), speciality hospitals, dates of admission and discharge, amount involved, donor agency, means of payment, nominee declaration/affidavit (in case of death)
- Documents (as relevant): death certificate, nominee details, copy of FIR, post-mortem, ID card, treatment history, copy of bank transfer of money/DD, etc.
- Media report clippings, if any
- Independent party verification reports for genuineness of cases

3.3. ENSURING LONG-TERM EMOTIONAL WELL-BEING OF HUMANS

- Incidents involving health emergencies due to HWC may result in emotional trauma. Therefore, humans in a HWC-related emergency may be screened for emotional trauma at government hospitals.
- If any evidence of emotional trauma is found, the victim may be provided counselling, alongside treatment of physical injuries.
- In case of long-term psychological impact, regular counselling sessions at the nearest government facility may be provided.

4. ADDRESSING WILDLIFE HEALTH EMERGENCIES

4.1. IDENTIFICATION OF WILDLIFE HEALTH EMERGENCIES

- **Self-Inflicted injuries:** Injuries caused due to panic and stress while trying to escape after human sighting or from trap or transportation cages with sharp edges after being trapped.
- **Accidental Injuries:** Injuries caused due to difficult undulating terrain, hidden traps, snares, electric fences, pits, wells, etc.
- **Human-Inflicted injuries/wildlife health emergencies:** Retaliatory attacks, feeding on poisoned carcasses, shooting with air rifles, injuries caused due to use of inappropriate physical or chemical capture methods, internal haemorrhage or organ rupture due to darting at a wrong anatomical site, overdosing or underdosing of immobilisation drugs, mishandling of immobilised animals, improper positioning of the immobilised wild animal resulting in choking, bloating, lung compression and aspiration of oropharyngeal or gastric contents.
- **Wildlife health emergencies caused by stress/panic:** Shock, anxiety, restlessness, capture myopathy, arrhythmia, respiratory distress, cardiac arrest, etc.

4.2. ADDRESSING WILDLIFE HEALTH EMERGENCIES ON-SITE

- Ensure ABC (airway, breathing & circulation).
- Measure the vital parameters like respiration, heart rate, pulse, temperature and blood pressure.
- Stabilise the animal using the available resources.
- Give the antidote if any complication has occurred due to overdosing or an allergic response to any immobilisation drug used.
- Check if any excessive bleeding is seen.
- Maintain the airway open.
- Look for any external injuries like cuts, wounds and burns.
- Infuse fluid/rehydrate if animal is dehydrated and compromised.
- Place the animal in a comfortable position under minimal required safe physical/chemical restraint to eliminate chances of animal hurting itself or the treating team.

- Respiratory stimulants and small oxygen cans may be used in case of respiratory arrest, if available, in your first aid kit by/under the guidance of a qualified veterinarian.
- Prepare the animal for transport to the nearest well equipped veterinary healthcare centre if the condition is critical and not manageable on-site. Else, shift the stabilised patient to the nearest rescue centre for further follow-up treatment & care.

4.3. ADDRESSING VETERINARY HEALTH EMERGENCIES DURING TRANSPORTATION

- Transport the animal only after providing first aid and stabilising it.
- A qualified trained veterinarian along with his/her assistant may accompany the animal either in an ambulance or in a separate vehicle following the ambulance.
- The ambulance speed may not be high as to cause stress and injury to the animal. Sudden jerks may be avoided.
- The transportation box may be properly secured in the ambulance, and its size may be such as not to allow turning or involuntary rolling of the animal sideways or back and forth inside the box, causing further panic and injuries.
- The veterinarian may keep monitoring the vitals at regular intervals and continue providing fluids and oxygen if required.
- Top up the tranquiliser/sedative drug so as to maintain the animal in a stress-free, calm position.
- Hand over all the relevant treatment documents to the treating veterinarian of the hospital when you shift the animal for further advanced treatment.

4.4. ADDRESSING VETERINARY HEALTH EMERGENCIES AT RESCUE/ VETERINARY HEALTHCARE CENTRE/ OFF-SITE

- Measure the primary vitals and assess the health status of the animal.
- Go through the history of the injury/health issue and the treatment of the patient.

- Collect relevant biological samples and send them to the lab for investigations.
- Decide a plan of further treatment and instruct the attending staff to execute it.
- Provide the required life support through medicines and veterinary machines/devices according to the health status of the animal.
- Correlate the findings of the investigations with the clinical status, come up with a diagnosis and provide specialised treatment.
- Plan for the required surgery, if any, after proper stabilisation of the patient.
- Explain the actual health status, prognosis and risks involved in the surgery to the person in charge of the patient.
- Ask for a copy of the permission issued by the Chief Wildlife Warden for the immobilisation and treatment of the wild animal and get the consent form signed by the attendant or forest staff member in charge after explaining all the possibilities clearly.
- In case the required veterinary facilities are unavailable, refer the patient to the nearest higher centre.

4.5. ADDRESSING UNTREATABLE WILDLIFE HEALTH CONDITIONS

- In extreme conditions, when the health damage is beyond treatment and the animal is in great continuous pain, it is advisable not to prolong the suffering of the animal and present the case to the approved Euthanasia Panel through the proper channel, submitting all the relevant documents for their reference and requesting them to allow humane euthanasia for that animal as per the rules and regulations.

4.6 DOCUMENTATION

- Documentation of all relevant wild animal emergency healthcare provision after an incidence may be created for future reference. The case report may be in a suitable format which that is understandable and from which data can be easily gathered. These clinical records may include basic information regarding the case such as wild animal details, emergency steps taken and details of the veterinarian. These records must be clear, accurate, legible and documented in a scientific manner.

5. ADDRESSING VETERINARY EMERGENCIES IN DOMESTIC ANIMALS

5.1. IDENTIFICATION OF HEALTH EMERGENCIES

- Wild animals are implicated for attacking both livestock, like cattle, buffaloes, sheep and goats and pet animals (dogs, cats) staying in proximity of the forest habitats.
- Some observed conditions of animals after attacks that need immediate treatment are trauma, shock, poisoning, difficulty in breathing, persistent seizures, abnormal heart rhythms, loss of consciousness, excessive bleeding, prolapsed organs, potential snake bite, open wounds with extensive exposure of soft tissue or bones. These may usually be treated immediately.
- Common reasons for sudden death of an animal include airway blockage, breathing difficulty, cardiopulmonary arrest, circulatory failure, arrhythmia, dysrhythmia, prolonged internal haemorrhage and massive external bleeding. Animal may be evaluated for the airway, breathing and circulation, as well as for level of consciousness. An animal may be checked for clear airways and breathing pattern by monitoring the chest movement. If the animal shows signs of difficulty in breathing/laboured breathing, immediate veterinary assistance may be obtained. Poor assessment and delay in attending to the - injured animal, may result in bad prognosis.
- Wounds may be assessed for the extent of damage and bleeding. In case of severe bleeding, further steps may be taken to check the bleeding.

5.2. ADDRESSING HEALTH EMERGENCIES

5.2.1 On-site

- While attending to animals after an attack, one may keep calm and not panic. Assess the site for any additional threats in order to ensure further safety. Put a blindfold on the animal and stabilise it with minimal movement, especially if there are signs of nervous system injury, broken bones or any chance of a spinal injury. Contact the nearby veterinarian as soon as possible.
- Basic veterinary care can be provided at the site of the injury. Injured animals or animals in pain, may have a tendency to bite or scratch and so

must be approached carefully. When a dog or cat is handled, a muzzle may be applied for the safety of the handler. If an animal has chest injuries or if the animal is a dog with a short nose (brachycephalic breeds like pugs), it may not be muzzled. A cloth may be placed over the head and eyes to keep the animal calm. Cats can be wrapped in a towel to reduce the movement and placed in a dark box with adequate holes for breathing and observation.

- Depending upon the extent of bleeding and the nature of the wound, the case may be attended. In case of minor bleeding, the wound area may be carefully washed with clean water till the bleeding stops. In case of severe bleeding, a pressure bandage may be applied.- A veterinarian may be contacted for further attention in case of sutures.
- The breathing of the animal may be monitored closely. In case of laboured or difficult breathing, the animal may be kept in a position to maintain the airway optimally. This can be due to excessive bleeding or due to snake venom. Quick veterinary assistance is advised in such cases.
- Poisonous insect bites and snakebites needs immediate treatment. Rapid and appropriate treatment is of paramount importance. Therefore, the patient may immediately be shifted to the nearest well equipped higher veterinary care centre.

5.2.2 During transportation

- An injured animal may be afraid and anxious, and it may become aggressive. Such a situation may lead to self-inflicted injuries due to pain and panic. It may be handled with utmost care. Small animals may be wrapped in any cloth, gunny bag or towel that is available and transported in a vehicle to the nearest veterinary assistance. In order to avoid stress due to transportation, efforts may be made to avail veterinary assistance for treatment of large animals on the site. In unavoidable circumstances, animals may be transported in a vehicle with an anti-slip floor. Animals shall not be left unattended during transportation, and care may be taken to drive slowly in order to avoid any further injuries. Ventilation may be provided appropriately to the animals.

- When moving or transporting an injured animal, care may be taken to minimize motion of its head, neck and spine. A flat, firm surface of wood, cardboard or thick fabric may be used to provide support. If the animal acts confused or disoriented after trauma, keep the head slightly elevated during transport. Jerking or thrashing motions may be avoided, and care may be taken to prevent anything from pushing on the neck or jugular veins. Placing small animals like pups, cats, kids and lambs in boxes can minimize the stress during transport.

5.3. DOCUMENTATION

- Documentation of all relevant domestic animal emergency healthcare provision after a wildlife attack may be created for future reference. The case report may be in a suitable format which that is understandable and from which data can be easily gathered. These clinical records may include basic information regarding the case such as animal demographic information, severity of infliction, wild animal demographic details, emergency steps taken and details of the veterinarian. These records must be clear, accurate, legible and documented in a scientific manner.

6. TAKING A ONE HEALTH APPROACH

6.1 OVERVIEW OF ONE HEALTH APPROACH

One Health is a collaborative, multi-sectoral and trans-disciplinary approach—working at the local, regional, national and global levels—with the goal of achieving optimal health outcomes, recognising the interconnection between people, animals, plants and their shared environment.

6.2 KEY STAKEHOLDERS

The personnel involved in human–wildlife interactions—such as the Rapid Response Teams, rescue team members, veterinarians, veterinary assistants, patrolling forest staff, mahouts, snake rescuers and wild animal attendants in zoos, rescue centres, monkey sterilisation centres and elephant camps, as well as public health personnel such as ASHA workers and anganwadi workers are vulnerable to a variety of zoonotic diseases that can be transmitted from animals to humans, apart from the risk of disease transmission from humans to domestic animals and wildlife.

6.3 KEY MEASURES TO BE IMPLEMENTED TO OPERATIONALISE THE ONE HEALTH APPROACH

- The basic approach may be to integrate the concept of One Health, which links human and animal health in a shared environment into all the operations and HWC mitigation measures in the field.
- Veterinary capacities and infrastructure may be upgraded to facilitate disease monitoring in wildlife populations, for both wildlife conservation and to prevent the spread of zoonotic diseases to livestock and human populations and *vice versa*.
- To reduce the biotic pressure on forests and prevent the spread of zoonotic diseases, it is desirable to stall-feed high-yielding cattle.
- A well-formulated Wildlife Health Management and Disease Surveillance Plan may be developed at every division/protected area (PA). One Health guidelines developed by national and international organisations such as WHO, FAO and OIE and existing regulations such as IHR (International Health Regulations) may be followed as per their applicability in different situations and set-ups.
- All personnel involved in capture operations may be trained, vaccinated and equipped. Joint training programmes for ASHAs, AWWs and the RRTs of the SFDs as well as the RRTs formed under the IDSP may be implemented to develop a common understanding of the key issues of HWC and One Health. Training of the para-clinical workforces from both the domains may also be crucial for filling in the gaps in the public health sector to prevent, detect and respond to zoonotic disease outbreaks in a timely manner.
- An effective disease surveillance and disease reporting system may be developed, including standardised protocols:
 - A disease surveillance programme may be carried out by the forest/wildlife department in collaboration with the medical health and animal husbandry departments.
 - Important zoonotic diseases may be identified and prioritised according to their epidemiological patterns.
 - Approved safety protocols (wearing PPE, prevention of occupational health hazards) may be followed during the collection, handling, conducting of investigations, packing and despatching of biological samples.
 - A coordination mechanism may be developed between wildlife, veterinary and public health agencies, wildlife biologists, environmentalists and scientists/researchers for carrying out field programmes and operations.
 - Inclusion of a One Health module in the curriculum of the wildlife, veterinary and medical graduation programmes may help in the education of these professionals and may improve the coordination and collaboration later on in the field.
- The institutional structures at the state- and district-levels, viz., State-Level Coordination Committee (SLCC) and District-Level Coordination Committee (DLCC), may be used for facilitating integration of the One Health approach into the state, landscape and district-/division-level planning.

7. COMPETENCY-DEVELOPMENT OF PERSONNEL RESPONSIBLE FOR HEALTH EMERGENCIES

- The Supplementary Framework to HWC-NAP, *Establishment and Capacity Development of HWC Mitigation Response Teams*, provides detailed advice on the capacity development approach for the personnel responsible for HWC mitigation and may be followed to plan and implement capacity development measures.
- A One Health approach may be adopted when planning and implementing training measures to prevent the spread of zoonotic diseases during HWC mitigation operations at sites where increased human-wildlife-domestic animal interactions take place.
- Each forest division may establish model animal health monitoring teams and standardise occupational health and safety protocols and integrate them with the operations of selected RRTs, including demonstration training programmes and procurement of disposable accessories/basic equipment needed for such training programmes. These RRTs may effectively coordinate with the RRTs established under the IDSP of the Ministry of Health & Family Welfare, Government of India, which are mandated to investigate the outbreak and response to all Infectious diseases, including zoonotic diseases. The IDSP RRTs consist of a multi-disciplinary team including veterinarians and wildlife officers.
- Community-based institutions, panchayats, farmers and women may be facilitated in strengthening their capacities to reduce the negative impacts of HWC as well as those of zoonotic and other emerging diseases. This may facilitate the response teams in addressing health emergencies more effectively.
- CPR and basic life-support training may be provided to all personnel of the field response teams by forest departments in cooperation with training institutions from the wildlife and veterinary sector, with a focus on occupational health and safety and animal welfare.
- Training in animal capture and translocation may be provided keeping in mind occupational health and safety to all veterinary experts and members of the field staff to ensure minimum exposure to zoonotic and other emerging diseases.
- Specific measures may be implemented to ensure that the efforts made towards capacity development are sustainable and effective. The following are some indicative measures:
 - Training institutions from the forest, agriculture-veterinary and public health sectors may be identified at the national level, and in each state, to act as the anchoring institutions for implementing training programmes in health emergencies in HWC situations and for the One Health approach. These institutions may be facilitated to form a network for cross-sector knowledge and faculty exchange.
 - These training institutions may be facilitated by the respective ministries and state governments, in integrating training programmes addressing HWC-related health emergencies, adopting a One Health approach, into their regular curriculum.
 - These institutions may implement joint training programmes for the ASHAs, AWWs, para-veterinarians and wildlife workers to facilitate capacity development of these sectors in the prevention and control of zoonotic diseases.
- DLCC may facilitate joint training of the raid response teams from the forest department, IDSP, ASHA, AWW and other field teams of relevant departments and agencies, civil defense volunteers and home guards, casualty services personnel, local medical teams and other hospital staff, on regular basis.
- Procedures for the procurement, usage and maintenance of first aid/medical equipment may be established in line with the existing guidelines issued by the competent authorities. Procedures for the procurement, usage, storage and maintenance of drugs/medications/medical supplies may be established in line with the existing guidelines issued by the competent authorities.

8. MEDIA ENGAGEMENT

- During an HWC-related emergency situation, the media are bound to be around, to capture the news as it happens. To get to the action, media persons may get as close to the epicentre as possible. This could very well hinder the HWC mitigation operations and may lead to a spread of zoonotic diseases. To ensure that the conflict and zoonosis situation is handled carefully, keeping the safety of both humans and animals, the following indicative actions taken, which may be beneficial:
- **Engaging with media professionals in an HWC-related crisis situation.** Dedicated forest officials trained in media engagement may engage with media persons, delegating other members of the team to deal with the crisis. A good practice is also to quickly share a clearly written, crisp media release as soon as possible.

- **Planning for public outreach in times of crisis.** It may be effective to use multiple media outlets—print, TV, radio/FM, online, social media—to broadcast messages, asking the public not to panic, not to leave the safety of their homes and come out or attempt to harm a wild animal-in-conflict during an HWC situation.
- **General coordination between forest department and media during emergency situations.** During an HWC-related emergency, the forest department may involve and seek help from local press clubs, press associations and similar bodies to ensure that the media persons do not take undue risks.

Guidelines for Cooperation between the Forest and Media Sector in India: Towards Effective Communication on Human—Wildlife Conflict Mitigation, Taking a Harmonious Coexistence Approach may be referred to for further details on engaging with the media in health emergencies.

9. USE OF TECHNOLOGY

- Use of the Early Warning and Rapid Response (EWRR)⁵ system, development of advanced diagnosis and surveillance tools and use of new technology may enhance the overall efficiency of mitigation efforts in the field, effectively address health emergencies and prevent zoonotic and other emerging diseases.

- Division-wise mapping of health infrastructure for humans, wild animals and domestic animals on a single GIS platform may facilitate the first responders to effectively address the situation, and may also strengthen the inter-agency coordination.

10. ETHICAL CONSIDERATIONS

- All care should be taken to address the issues of animal welfare and animal rights as enshrined in the Constitution (articles 48A and 51A(g)), the statutory provisions of the Indian Penal Code (sections 428 and 429), the Prevention of Cruelty to Animals Act of 1960 (Section 11(1)(h) and Section 11(1)(d)) and the Motor Vehicles Act, 1978 (Transport of Animal) Rules, 2001.
- Efforts may be made to strengthen inter-agency cooperation, and to receive support from local agencies responsible for law and order so that the emergency operations are completed without delays and the health and well-being of humans and animals are ensured.

- Ethical considerations are the essence of the rule of law. Therefore, action taken to address HWC should be in conformity with human and animal rights, within the framework of existing legal provisions.
- Further measures to address the health of the specific species of wild animals-in-conflict during capture, translocation and post-capture management are provided in the species-specific guidelines, as indicated in Section 1.1 of these guidelines.

⁵ EWRR is a set of tools, processes and personnel competencies needed for timely and meaningful generation and dissemination of alert information to individuals, communities and establishments at risk, for optimal preparedness and responses at the appropriate time, to reduce the likelihood of injury, death or crop damage. EWRR structurally includes an HWC Mitigation Hub/Control Room and a system of three-tiered response teams, viz., Division-Level Rapid Response teams (Division RRTs), Range-Level Rapid Response Teams (Range RRTs) and village-/ward-level Primary Response Teams of the local community (Community PRTs).

11. USE OF LEARNINGS FROM THE GUIDELINES TO FURTHER STRENGTHEN INSTITUTIONAL AND POLICY FRAMEWORK ON HEALTH EMERGENCIES IN HWC SITUATIONS IN INDIA

These guidelines are expected to serve as a capacity development instrument, given that a robust and structured feedback mechanism will be put in place by the DLCCs and SLCCs to document the feedback received from the implementation of these guidelines.

- The feedback from the use of these guidelines may, therefore, be consolidated to form the basis for fine-tuning health emergencies and addressing the long-term risk of zoonotic and other emerging diseases during an HWC and for understanding capacity needs for effectively implementing the inter-agency coordination mechanism and taking a One Health approach.
- In the long term, the feedback may be consolidated and used in further revising/updating the capacity development strategies, Division-Level HWC Management Action Plans and National and State HWC Strategy and Action Plans.
- Feedback from the inter-agency teams may be used to further strengthen our understanding of the operationalisation of the One Health approach.

12. PROCESS OF DEVELOPMENT AND PILOT TESTING OF THESE GUIDELINES AND THE CONSULTATION PROCESS

- A dedicated framework of experts (Annexe 1) was formed, with the core team consisting of representatives from government agencies, SFDs, research institutions, civil society institutions and international organisations and independent wildlife policy experts. The experts were a mix of scientists, wildlife managers, public health experts, medical professionals, veterinary experts, policy experts and capacity development experts.
- A common understanding was developed on the overall purpose, scope, approach and methodology^{6,7}. The experts had different roles in the drafting and editing process, viz., they were Coordinating Lead Authors, Lead Authors, Contributing Authors and Review Editors. The Author Group worked on developing these guidelines between July 2019 and August 2021, during which period they consulted a larger group of experts and stakeholders via workshops, meetings and consultations. The authors reviewed the documents and guidelines available from the MoEF&CC and different states, and relevant information and recommendations were brought into the new document. The National Technical Group (NTG), consisting of experts from MoEF&CC, Wildlife Institute of India (WII) and *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and independent wildlife and policy experts, was formed for the overall steering and facilitation of the process. The Working Group on Pilot Implementation of Guidelines and HWC-NAP was formed to facilitate the planning and implementation of the pilot testing, consultations and final editing of the draft guidelines and HWC-NAP. Detailed terms of reference were provided for each category, and meetings and workshops of the Author Group were facilitated under the Indo-German Cooperation Project on Human–Wildlife Conflict Mitigation.
- The draft guidelines and HWC-NAP were pilot tested at selected HWC hotspots in India to receive feedback on the feasibility and acceptability of the recommendations expressed in the guidelines, using a structured process and tools. On the basis of the feedback received during fortnightly meetings and one-to-one consultations with managers, the draft of the guidelines was revised.
- A committee was constituted by MoEF&CC in December 2022, consisting of officials from MoEF&CC and the state forest departments of Bihar, Haryana, Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal to review and finalise the guidelines.

13. MONITORING AND EVALUATION OF GUIDELINES

- This set of guidelines is not a static document; rather, it is a living document. It will keep abreast of the various developments in field implementation methods and wildlife research. For this, the feedback from field practitioners and other wildlife experts may be analysed to assess the specific elements and sections that need to undergo changes. A review of the guidelines is planned every 5 years, from 2023 onwards. However, a mid-term review process in 2024 may be desirable. In the long term, the review cycle of these guidelines can be aligned with the review cycle of HWC-NAP.
- A detailed mechanism, templates and guidance for collating information and feedback related to the use of these guidelines may be developed.

6 Approach paper: <https://indo-germanbiodiversity.com/pdf/publication/publication19-04-2021-1618808050.pdf>

7 Human-Wildlife Conflict Mitigation Instrument- Strengthening Capacities to Address the issues related to zoonotic and other emerging diseases: Taking a One Health Approach [publication02-06-2022-1654169065.pdf](https://indo-germanbiodiversity.com/pdf/publication02-06-2022-1654169065.pdf) (indo-germanbiodiversity.com)

ANNEXE 1

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