



Government of India



Guidelines for Human-Leopard Conflict Mitigation

Taking a Harmonious-Coexistence Approach



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Ministry of Environment,
Forest and Climate Change,
Indira Paryavaran Bhavan,
Jor Bagh Road,
New Delhi - 110 003, INDIA
Website: www.moef.gov.in

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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	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>	PPE	Personal protective equipment
Goi	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

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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

NATIONAL TECHNICAL GROUP (NTG)

Shri Bivash Ranjan, <i>IFS</i> , Additional Director General of Forest (Wildlife), Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India (Gol) Dr S P Yadav, <i>IFS</i> , Former Additional Director General of Forest (WL), MoEF&CC, Gol (December 2021 to March 1, 2022) Shri Soumitra Dasgupta, <i>IFS</i> , Former Additional Director General of Forest (WL), MoEF&CC, Gol (June 2019 to November 2021)	Chairperson
Shri Rohit Tiwari, Inspector General of Forest (WL), MoEF&CC, Gol	Member
Shri Rakesh Kumar Jagenia, Deputy Inspector General of Forest (WL), MoEF&CC, Gol	Member
Dr Sunil Sharma, <i>IFS</i> , Joint Director (WL), MoEF&CC, Gol Dr R. Gopinath, <i>IFS</i> , Former Joint Director (WL), MoEF&CC, Gol (June 2019 to December 2020)	Member
Director, Wildlife Institute of India (WII)	Member
Shri P C Tyagi <i>IFS</i> (Retd.), Former Principle Chief Conservator of Forests-Head of Forest Force, Tamil Nadu	Member
Late Shri Ajay Desai Wildlife Expert (June 2019 to November 20, 2020)	Member
Dr Sanjay Gubbi Wildlife Expert, Nature Conservation Foundation (June 2019 to November 20, 2020)	Member
Dr Neeraj Khara Team Leader, Indo-German Project on HWC Mitigation, GIZ India	Member Convenor

WORKING GROUP ON PILOT IMPLEMENTATION OF GUIDELINES AND HWC-NAP

Dr. Neeraj Khara, Team Leader, Indo-German Project on HWC Mitigation, GIZ India (Member Facilitator) Dr. Bhaskar Acharya, Independent Wildlife and Documentation Expert Ms Naghma Firdaus, Disaster Management Specialist Shri Ramesh Menon, Media Expert Shri C. Sasi Kumar, Technical Officer, MoEF&CC Shri Aditya Bisht, Project Elephant-MoEF&CC Shri Siddhanta Das, <i>IFS</i> (Retd.), Former DGF&SS, MoEF&CC Shri Ajai Misra, <i>IFS</i> (Retd.), Former PCCF (WL), Karnataka Shri Sanjay Srivastava, <i>IFS</i> (Retd.), Former PCCF- HOFF, Tamil Nadu Shri P C Tyagi, <i>IFS</i> (Retd.), Former PCCF-HOFF, Tamil Nadu Dr. C. Ramesh, Scientist, Wildlife Institute of India Dr. K. Ramesh, Scientist, Wildlife Institute of India Shri Surendra Varma, Asian Nature Conservation Foundation Dr. Nayanika Singh, M&E and Policy Expert
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AUTHOR GROUP FOR DRAFTING THE GUIDELINES

Dr. Sanjay Gubbi, Wildlife Expert, Nature Conservation Foundation (NCF) Dr. K. Ramesh, Scientist, Wildlife Institute of India	Coordinating Lead Authors
Dr. Aditi Sharma, Senior Veterinary Officer, Animal Husbandry Department, Uttarakhand Government Dr. S. P. Goyal, Emeritus Scientist, Wildlife Institute of India Dr. Koko Rose, <i>IFS</i> , Divisional Forest Officer, Tehri Division, Uttarakhand Forest Department Dr. Aritra Kshetry, Wildlife Expert Ms Naghma Firdaus, Disaster Management Specialist Dr. Amit Mallick, <i>IFS</i> , Inspector General of Forests, National Tiger Conservation Authority	Lead Authors
Shri Sunil Limaye, <i>IFS</i> , Former Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Maharashtra Shri Akash Verma, <i>IFS</i> , Divisional Forest Officer, Uttarakhand Forest Department Shri Vimarsh Sharma, Technical Expert, Indo-German Project on HWC Mitigation, GIZ India Dr. Vidya Athreya (contributed to the early draft of the guidelines), Country Director, Wildlife Conservation Society of India	Contributing Authors
Shri P. C. Tyagi, <i>IFS</i> (Retd.), Former PCCF-HOFF, Tamil Nadu Shri Sanjay K. Srivastava, <i>IFS</i> (Retd.), Former PCCF-HOFF, Tamil Nadu	Review Editors



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