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CONVENING PAPER

Human-wildlife coexistence: review of piloted solutions in the Kangchenjunga Landscape

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Background

Human-wildlife interactions in the Kangchenjunga Landscape are shaped by long-standing elephant movement corridors that currently intersect with settlements, farmlands, tea estates, transport infrastructure, and other land uses. In response, partners in Bhutan, India, and Nepal with support from the International Centre for Integrated Mountain Development (ICIMOD) piloted a range of human-wildlife coexistence solutions during 2024-2025. This workshop 'Human-wildlife coexistence: review of piloted solutions in the Kangchenjunga Landscape' was conducted to review progress against the human-wildlife coexistence solutions piloted to assess which measures were effective and why, identify weak or incomplete interventions, and agree on priorities for scaling and sustaining the work beyond 2026.

Overview of the meeting

A regional review workshop on human-wildlife coexistence solutions was held in Chalsa, West Bengal, India, from 10 to 12 November 2025. The meeting brought together implementing partners, technical practitioners, and supporting institutions working in the Kangchenjunga Landscape to review pilots undertaken in Bhutan, India, and Nepal, compare lessons, and agree on a common direction for scaling, sustainability, and transboundary coordination on human-wildlife coexistence solutions

Issues discussed

Review of pilots implemented in 2024-2025

- Partners presented coexistence measures piloted in sites affected mainly by human-elephant conflict, and in some areas by wild boar, monkeys, and leopard. The measures ranged from rapid response team and coexistence infrastructure to awareness, early warning, and livelihood support.
- Ashoka Trust for Research in Ecology and the Environment (ATREE) reported work in Naxalbari, West Bengal, India and surrounding ranges, including identification of vulnerable sites (n = 12) across the Mechi River, baseline surveys, operational support to Rapid Response Teams (RRTs), construction of watchtowers as a safe monitoring infrastructure, installation of solar streetlights, safe storage spaces, and promotion of alternative crops such as bay leaf, lemongrass, and mustard.
- The Bhutan Ecological Society (BES) reported baseline surveys conducted in Samtse district and Chukha district using digital tools and implementation of solar electric fencing, streetlights, Global Positioning System (GPS) collaring of elephants, awareness materials in local languages, and training for Quick Response Teams (QRTs). BES had also in-kind support for the human-elephant conflict affected families.
- Ujyalo Nepal reported low-cost seasonal electric fencing in Jhapa, eastern Nepal, establishment and equipping of RRTs, installation of early warning systems in coordination with district authorities, elephant profiling, school and community awareness, and livelihood activities such as straw-mat weaving and local product branding.

Evidence on effectiveness: what worked and why

- Across the three countries, participants agreed that community-owned rapid response systems were among the most reliable solutions, particularly where response teams were trained, equipped, insured, and linked with local authorities. Communities were better prepared to respond safely to elephant movement and crop-raid incidents in guidance of rapid/quick response teams.
- Safe monitoring infrastructure, especially watchtowers, was widely regarded as effective because it improved visibility, supported early detection, and reduced direct encounters between human and elephant. In the Naxalbari

area, watchtowers were associated with a sharp reduction in crop damage and a return of cultivation in some affected areas.

- Seasonal or solar electric fencing was considered effective in Nepal, installed with community participation, and paired with clear maintenance arrangements. Participants noted that simple, locally sourced designs were easier to repair and more likely to remain functional over time.
- Early warning and communication improvements, including GPS collaring, field communication systems, repeaters, sirens, and local information sharing, helped improve preparedness and coordination in Bhutan. Elephant profiling and naming were also seen as useful for public awareness, for communicating the risk of "problem" individuals, for identifying repeat movement patterns, and for strengthening transboundary coordination in monitoring individuals moving across the border in Nepal and India.
- Partners highlighted livelihood diversification and support to local value chains as important complements to conflict mitigation. Measures such as mustard cultivation, bay leaf and lemongrass planting, seasonal beekeeping, skill development, and branding of local products were seen to reduce dependence on risky practices (going to forest for firewood).

Solutions found less effective, incomplete, or need further assessment

- Some interventions were found to be less attractive or slower to produce results. In India, improved cookstoves had low uptake because households preferred other energy options, while group farming and some alternate crop initiatives had started too recently for their effectiveness to be measured.
- In Bhutan, bio-fencing was considered difficult because establishment was slow and sites faced grazing pressure. Participants also noted sustainability concerns with earlier crop insurance arrangements and operational problems with older early warning systems, including indiscriminate alarms and technical faults.
- In Nepal, livelihood pilots such as straw-mat weaving, branding support, and some cross-learning activities were still too early to evaluate. Participants observed that weak market linkages and the absence of stronger institutional support could limit the long-term value of such interventions if not addressed.

Scaling pathways for 2026 and sustainability beyond the current phase

- The three country teams presented site-specific scaling plans for 2026 and beyond. These included further investment in watchtowers, water infrastructure, targeted awareness, strengthening response teams, habitat restoration, and improved coordination with forest, municipal, and other local authorities.
- In Nepal, plans included scaling seasonal fencing, response teams, and early warning systems in Rong Rural Municipality and Mechinagar, while extending coexistence work to Bardiya, western Nepal through collaboration with park authorities and local actors.
- In Bhutan, proposed scaling actions included new watchtowers and electric fencing in priority sites, strengthening QRTs, improving standard operating procedures (SOPs) and training, and linking habitat improvement with research and monitoring.
- Participants stressed that sustainability would depend on formal handover, community custodianship, local government financing, user-group by-laws, cooperative management, and routine monitoring. The workshop also underscored the value of transboundary cooperation, shared data, and regionally aligned research on elephant movement and ethical use of technologies such as drones and collaring.

Recommendations/ Way forward

- Continue to prioritise community-owned and community-maintained coexistence measures, particularly watchtowers, rapid response systems, practical fencing models, and early warning arrangements that can be operated locally.
- Scale the most effective interventions in 2026 through site-specific packages rather than a single fixed model, recognising that terrain, species, settlement patterns, and institutional support differ across the landscape.
- Strengthen RRTs and QRTs through refresher trainings, safety equipment, communication tools, accident insurance, and closer linkage with local government and line agencies.
- Improve maintenance and governance arrangements for coexistence infrastructure by formalising handover processes, clarifying roles, and developing user-group rules, cost-sharing mechanisms, and simple maintenance schedules.
- Retain livelihood diversification as part of coexistence programming, but focus on options that have realistic market pathways, strong community interest, and support from local institutions or private actors.
- Continue elephant profiling, GPS-based movement monitoring, and local information-sharing to improve preparedness, strengthen awareness, and support transboundary coordination where elephant ranges cross administrative or national boundaries.
- Review early warning systems and replace or redesign approaches that create false alarms, technical failures, or unclear lines of responsibility. New systems should be tested for reliability, ease of operation, and local ownership before wider rollout.
- Link coexistence investments with habitat restoration, especially in sites where invasive species, monoculture, degraded riverbeds, or dry-season water scarcity increase pressure on wildlife movement routes.
- Embed successful interventions into local development and conservation plans so that municipalities, forest divisions, user groups, and community institutions can continue financing and oversight beyond the current project cycle.
- Document results in a consistent way across countries in 2026, including evidence on effectiveness, maintenance costs, community uptake, and incidents avoided, so that future decisions are based on comparable field evidence.

Annexe

Annexe 1. Effective solutions highlighted by partners

Partners	Key effective solutions
ATREE (India)	RRT gear and training, watchtowers, awareness, alternative crops
Bhutan Ecological Society (Bhutan)	QRT formation, solar electric fencing, watchtowers, radio collaring, drone monitoring, field communications, awareness and baselines
Ujyalo Nepal (Nepal)	Seasonal fencing, RRT formation, elephant profiling, awareness materials and videos, community and school outreach

Annexe 2. Solutions found less effective or still pending assessment

Partners	Less effective/pending solutions	Reasons/comments
ATREE (India)	Improved cookstoves, group farming/alternate crops	Low preference for cookstoves, some pilots started recently and need more time for assessment
Bhutan Ecological Society (Bhutan)	Bio-fencing, legacy crop insurance, older early warning systems	Slow establishment, grazing pressure, sustainability concerns, indiscriminate alarms, and technical faults
Ujyalo Nepal (Nepal)	Straw-mat weaving, branding support, cross-learning activities	Market gaps, delayed rollout, and effectiveness not yet assessed

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