Human-Wildlife Conflict Management

Conflict to Coexistence (C2C) strategy for **Patsaling Gewog**, Tsirang (2026-2030)

Divisional Forest Office-Tsirang
Department of Forests and Park Services
Ministry of Energy and Natural Resources

WWF

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Abbreviations

BPCL.....	Bhutan Power Corporation Limited
C2C	Conflict to Co-existence
CBCM	Community-Based Conflict Management
CFO	Chief Forestry Officer
DFO.....	Divisional Forest Office
DoFPS.....	Department of Forests and Park Services
DOR	Department of Road
ECCD	Early Child care and Development
FGDs	Focused Group Discussions
HWC.....	Human Wildlife Conflict
IKI	International Climate Initiatives
LG	Local Government
M&E	Monitoring and Evaluation
NC	National Council
NFE	Non- formal Education
ORC.....	Outreach Clinics
PA	Protected Area
QRT	Quick Response Team
RNR-EC	Renewable Natural Resources Extension Centre
RO	Range Officer
SMART.....	Spatial Monitoring and Reporting Tool
SRFL	State Reserve Forest Land
UI	Understanding Interaction
WWF.....	World Wildlife Fund

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Royal Government of Bhutan
Ministry of Energy and Natural Resources
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Foreword

Human-Wildlife Conflict (HWC) continues to pose a serious challenge to conservation efforts and rural livelihoods in Bhutan, especially in forest-dependent areas such as Patsaling gewog. With growing pressures from climate change and expanding development, the need to strengthen peaceful coexistence between communities and wildlife is more urgent than ever.

The Conflict to Coexistence (C2C) Strategy for Patsaling gewog (2026–2030) is a timely and community-led initiative, developed through field studies and consultations across all chiwogs. The strategy aims to reduce conflicts with important wildlife species while improving local livelihoods, conserving habitats, and supporting wildlife to live safely alongside people. It emphasizes prevention, effective mitigation measures, and active participation from local communities.

Supported by the IKI-WWF Project, "Living Landscapes: Securing High Conservation Values in South-Western Bhutan," and implemented in close partnership with local governments and other stakeholders, this Strategy serves as a clear and practical guide for promoting sustainable co-existence. would like to express my heartfelt appreciation to the communities of Patsaling gewog and the DFO Tsirang team for their commitment and leadership in advancing this important initiative. The Department of Forests and Park Services remains fully dedicated to implementing this Strategy to ensure the long-term protection of biodiversity and the well-being of communities for future generations.

(Karma Tenzin)
Director

Acknowledgement

The C2C Strategy for Patsaling gewog is the result of a collective and dedicated effort by the staff of the Divisional Forest Office, Tsirang. The Division sincerely acknowledges the commitment, professionalism, and teamwork demonstrated by all officers and staff who contributed their time, experience, and technical inputs toward the successful formulation of this strategy. Their sustained engagement throughout the process ensured that the document is comprehensive, practical, and grounded in field realities.

The formulation of this strategy was made possible through the unwavering support and guidance of the Department and WWF, Bhutan. The Division is deeply grateful for their strategic direction, technical advice, and continuous encouragement. The Division further expresses its sincere gratitude to the IKI Project, "Living Landscapes: Securing High Conservation Values in South-Western Bhutan," for its generous financial support, which enabled the conduct of comprehensive socio-economic and field surveys. The data generated through these assessments formed a critical foundation for evidence-based planning and significantly informed the management interventions contained in this strategy. WWF–Bhutan, together with the Project Coordination Unit, played a pivotal role in facilitating the timely procurement of essential equipment and field gear, and in delivering capacity-building programs. These interventions greatly strengthened the technical capacity of the field teams involved in the assessment.

The Division would like to extend special appreciation to Mr. Tshering Wangchuk of DFO Tsirang, who played a crucial leadership role in guiding and coordinating the formulation of this strategy. His dedication, technical oversight, and leadership were instrumental in bringing the C2C planning process to completion. Finally, the Division extends its heartfelt thanks to all individuals, institutions, and stakeholders who, in various capacities, contributed to the development of this strategy. Their collective efforts have resulted in a key milestone that will guide Human Wildlife Conflict management and their co-existence in Patsaling gewog in the years to come.

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1. Introduction

Human-Wildlife Conflict (HWC) is a widespread global issue that arises when interactions between humans and wildlife result in negative consequences for both (Conover, 2002).Humans depend on nature and its wide array of services for sustenance of their livelihoods and over a millennia human have lived with wildlife both in conflict and coexistence. While humans and wildlife have coexisted for thousands of years, the modern Anthropocene era, marked by human-dominated landscapes and extensive human-wildlife interactions has intensified both the frequency and severity of these conflicts (Caro et al., 2012). Contributing factors such as rapid population growth, accelerated development, habitat loss, and habitat fragmentation have significantly increased human-wildlife encounters, often leading to adverse outcomes for both communities and wildlife.

Patsaling gewog is located in the southern part of Tsirang dzongkhag and is the largest gewog, covering an area of 170.9 square kilometers. Agricultural practices are predominantly based on dryland farming, with maize, wheat, and mustard as the main crops. In other parts of the gewog, wetland cultivation is also practiced, where paddy and wheat are the principal crops. Cardamom and a variety of vegetables constitute the major cash crops. Patsaling gewog has been identified as one of the major human–wildlife conflict (HWC) hotspots in the dzongkhag. According to the Socio-Economic Survey (SES) conducted in 2023, the gewog experiences frequent crop damage and livestock losses, primarily caused by wild pigs, barking deer, monkeys, and porcupines. Additionally, Patsaling reported a total of 26 human wildlife conflict (HWC) cases over the past three years, underscoring the persistent and widespread nature of human–wildlife conflict in the area. This ongoing challenge disrupts agricultural activities, affects the peace and well-being of farming communities, and undermines their ability to sustain livelihoods. If left unmanaged, such conflicts can negatively impact both wildlife populations and local communities, emphasizing the urgent need for continuous innovation and adaptive strategies to mitigate human–wildlife conflict and promote peaceful coexistence.

To address these challenges, the Royal Government of Bhutan, along with various global initiatives, has adopted multiple approaches and strategies for managing human–wildlife conflict (HWC). Among these, the Conflict to Coexistence (C2C) Approach provides an integrated, holistic, and inclusive framework for HWC management at the landscape level. It follows a step-wise methodology supported by tools for implementation, monitoring, and adaptive management. The approach was tested through several projects between 2016 and 2022, and feedback from these pilots revealed key challenges, including inconsistencies in rapid assessments, methodological limitations, and barriers to effective implementation of management

strategies. In response, the refined C2C: Conflict to Coexistence Approach was developed and piloted in 2023. The approach comprises a seven-step process for formulating HWC management strategies, with Step 4 focusing on the Co-design of HWC management strategies. This step emphasizes close collaboration with communities and stakeholders to develop effective, locally appropriate, and sustainable solutions. Co-design is widely recognized as a participatory and collaborative process that ensures active stakeholder engagement and incorporates adaptive management, enabling communities and other stakeholders to meaningfully shape Human wildlife conflict (HWC) management interventions (WWF, 2023).

2. Goal and Objectives

Goal: : *"To ensure harmonious co-existence between wildlife and people through holistic approach"*

Objectives:

1. Safeguard people and their livelihood/assets alongside wildlife presence.
2. Secure wildlife and its habitat to sustain a healthy and resilient wildlife population.

3. Methodology

3.1. Site Description

Patsaling gewog is located in the western part of the Dzongkhag, approximately 10 kilometers from the Dzongkhag headquarters. It is the largest gewog in the Dzongkhag, covering an area of 170.9 square kilometers. The gewog comprises 296 households distributed across five chiwogs: Patshaling Toed, Patshaling Maed, Thakorling, Chhuzomsa, and Pangthang. The total population is 2,505, consisting of 1,249 males and 1,256 females. The elevation of the gewog ranges from 600 to 1,900 meters above sea level (masl). Agricultural land use in the upper region is predominantly dryland, where crops such as maize, wheat, and mustard are commonly cultivated. In contrast, the lower region consists mainly of wetland areas, with paddy and wheat as the major crops. Cardamom and vegetables are the principal cash crops grown in the gewog. Almost every household practices integrated farming, including livestock rearing, poultry farming, and beekeeping.

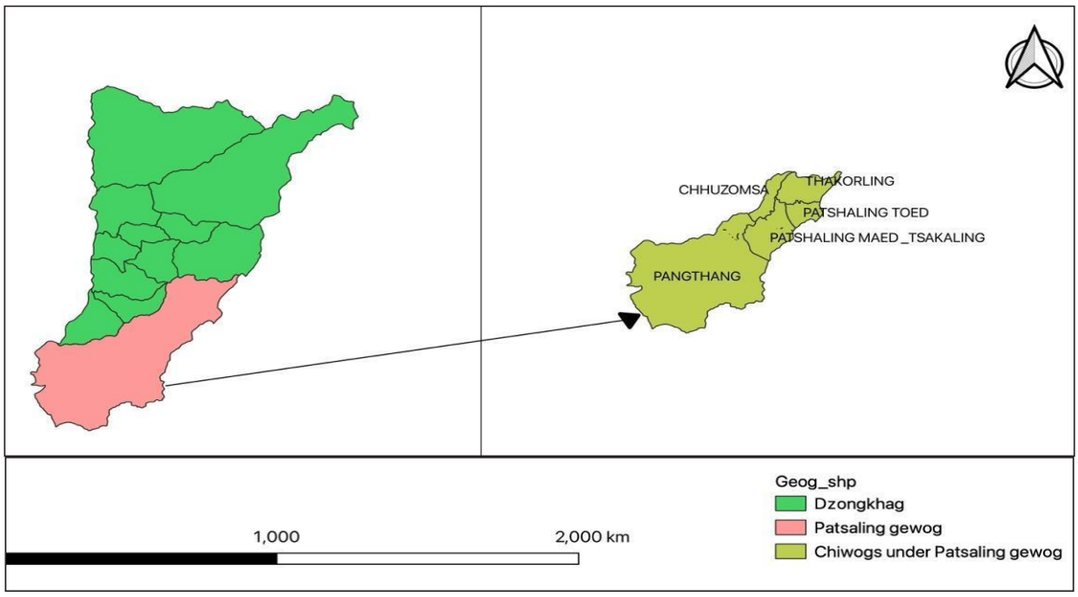

Figure 1: Map of the Study Area

3.2 Methods: C2C Framework

This strategy is developed based on the principles and methodologies of the Conflict-to-Coexistence (C2C) approach. The C2C framework provides a structured and integrated model for the systematic planning, implementation, and monitoring of human-wildlife conflict (HWC) management. It is underpinned by key principles of holism, resilience, shared responsibility, and tolerance. The approach operates on four fundamental assumptions: achieving all four primary outcomes is essential for effective human-wildlife conflict (HWC) management. By offering clear, stepwise guidance, the C2C framework supports the development of integrated and holistic strategies that balance long-term solutions with short-term interventions.

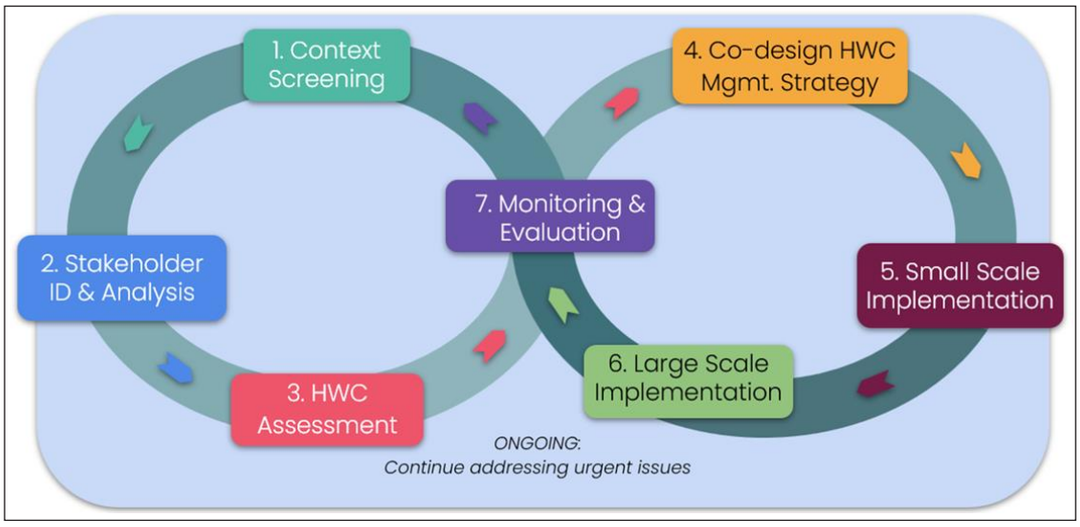

Figure 2: Conflict to Co-existence Framework

3.2.1. Context Screening

Context screening is a fundamental step in designing relevant and effective interventions, as it is based on a thorough understanding of the local setting in which human–wildlife conflict (HWC) occurs. It ensures that all stakeholders share a common understanding of the landscape, the conflict dynamics, and the socio-ecological context, thereby enabling the development of solutions that are appropriate for both local communities and the environment. Context screening represents the first stage of the assessment process and focuses on identifying and analyzing the key characteristics of the landscape and the prevailing HWC situation.

Prior to completing the context screening, comprehensive baseline information on the landscape was collected. This included social landscape mapping, government census data, and other relevant secondary sources. The Conflict-to-Coexistence (C2C) Project Manager also consulted with colleagues and key stakeholders, including local government officials and representatives within the landscape, to gather site-specific and contextual information. Based on these inputs, the context screening form was completed.

The context screening comprises several key sections, including: site description (covering landscape characteristics, human demographics, and livelihood patterns); trends in human–wildlife conflict (such as conflict species, frequency and severity of incidents, types of conflict, and existing management interventions); drivers of human–wildlife conflict (both anthropogenic and natural); wildlife dynamics (including trends in conflict and prey species, movement patterns across the landscape, and factors influencing conflict); and relevant policies and institutional frameworks.

3.2.2. Stakeholder Identification and Analysis

Stakeholders are individuals or groups of individuals who have an interest, or "stake," in the subject under consideration, in this case the HWC situation. Typically, multiple stakeholder groups are involved in HWC scenarios. Some groups are directly impacted by Human-Wildlife Conflict (HWC), others are involved in its management, again others are not directly affected but highly influential. For the Conflict-to-Coexistence (C2C) Approach, it is crucial to understand who these stakeholders with regards to Human-wildlife conflict are and how they can work together. Therefore, a core team which consists of Chief Forestry Officer, IKI focal DFO, Tsirang, section heads, Range officer, Officials of Local government, Gewog agriculture and livestock extension officers and Tshogpas of five Chiwogs was formed.

Stakeholder analysis utilizing a stakeholder analysis matrix was conducted, where stakeholders were grouped into clusters to inform the Conflict-to-Coexistence(C2C) assessment and consultations during the strategy development phase. This matrix applies a structured evaluation approach

by addressing a series of questions rated on a scale of 1 to 5, focusing on the following dimensions:

- Stakeholders' level of interest in Human-Wildlife Conflict (HWC) and its management within Patsaling Gewog.
- Their capacity to influence the long-term effectiveness of a Human-Wildlife Conflict management plan.
- Their willingness and ability to engage in the collaborative design of the Human-Wildlife Conflict (HWC) management strategy.

Table 1: Stakeholder Analysis Matrix for Patsaling gewog

Stakeholders	Interest	Influence	Category
Forestry	5	5	High interest high influence
Agriculture	5	5	
Livestock	5	5	
LG (Gup, Mangmi, ADM)	5	5	
Patshalingmaed Tshogpa	5	5	
Patshalingtoed Tshogpa	5	5	
Pangthang Tshogpa	5	5	
Thakorling Tshogpa	5	5	
Chidzomsa Tshogpa	5	5	
National Assembly	5	5	
National Council	5	5	
local communities	5	5	
Dairy Group	5	5	
Vegetable group	5	5	
Dzongkhag Adminstration	5	5	
Hazelnut representative	5	2	High interest low influence
Thakorling CF	5	5	High interest high influence
Tsakalingnorzay CF	5	5	
Yarkey CF	5	5	
Kuchi Darachu CF	5	5	
Chudzomsa CF	5	5	
Gadhenjong CF	5	5	
QRT	5	5	
TARAYANA	5	5	
Bee keeping Group	4	5	
PES(Payment for Ecosystem Services) scheme	4	2	Medium interest low influence
Vegetable vendor	4	3	Medium interest medium influence
Sai Tshogpa	4	5	Medium interest high influence
BPC	2	3	Low interest medium influence
Gewog Lhakhang	2	4	Low interest medium influence
Hindu Mandhir	2	4	
Schools	2	5	Low interest high influence

ECCDs	2	2	Low interest low influence
NFEs	2	4	Low interest medium influence
Redcross	2	3	Low interest medium influence
Desuung	2	4	
RENEW	2	4	
Shop keepers	2	3	
Road User group	2	2	Low interest low influence
Community contractors	2	2	
DoR	2	2	
Local Healer (Kuchi)	2	4	Low interest medium influence
Wood craft (Pangthang)	2	2	Low interest low influence
Telecom	2	4	Low interest medium influence
BDBL	2	4	
BHU	1	1	Low interest medium influence
Furniture house	1	1	

The stakeholder analysis reveals a diverse range of interest and influence levels across groups involved in the HWC (Human-Wildlife Conflict) management. Stakeholders with both high interest and high influence, such as local leaders (Gups and Tshogpas), Mangmi, RNR sectors, Members of National Assembly and National Council and are key players who can significantly impact the strategy's success. Medium influence stakeholders, including Dzongkhag Administration, Community Management Groups, and Piggery Group,Tarayana also hold substantial interest in the initiative and can play supporting roles, particularly in information dissemination and resource management.

Low influence stakeholders, like schools, Banks, Non-formal Education(NFEs), gewog Lhakhang have high interest but limited power to shape long-term outcomes; however, their active participation is essential for ground-level implementation. Conversely, stakeholders with low interest and influence, such as Early Child Care and Development (ECCD), furniture house and Basic Health Unit (BHU) have minimal direct impact on the initiative. This analysis highlights that fostering cooperation among high- and medium-influence stakeholders, while actively engaging community members with high interest, will be critical for the sustainable success of the Human Wildlife Conflict (HWC) management strategy.

3.2.3 HWC Assessment

The "Conflict to Coexistence" assessment in Patsaling was conducted from 13th April to 19th March 2025. Patsaling gewog comprises five chiwogs: Patsaling Maed, Patsaling Toed, Thakorling, Pangthang and Chhudzomsa. To determine an appropriate sample size from the total household population, Yamane's formula was applied: Where n = Sample size; N = Total Population/

HHs in the gewog; e = level of precession (e.g. margin of error, commonly 5% or 0.05 for 95% confidence level). Based on this calculation, the sample size for the survey was 170 households were

$$n = \frac{N}{1+Ne^2},$$

selected randomly from all chiwogs and interviewed out of a total of 296 households across the five chiwogs in the gewog. Efforts were made to alternate between male and female respondents to minimize gender bias within the sample.

Three different groups of interviewers were identified: Community Members and Service Providers/Duty Bearers. The SMART (Spatial Monitoring and Reporting Tool) app, which had preloaded questionnaires created especially for this purpose, was used to conduct in-person interviews to collect data.

Table 2: Household Survey from each chiwog under Patsaling gewog

Sl/No.	Name of Chiwog	HHs	No. of HHs interviewed	Sample Size
1	Patsaling Maed	52	29	170
2	Patsaling Toed	41	24	
3	Thakorling	80	46	
4	Pangthang	49	28	
5	Chhudzomsa	74	43	
Total HHs		296	170	

After determining the total sample size for the gewog, the sample is proportionally distributed among chiwogs based on their household size. This ensures fair representation.

The proportional allocation formula is:

Where:

n_i = Sample size for a specific chiwog

N_i = Population of that chiwog

N = Total gewog households

n = total calculated sample size for the gewog

This approach ensures statistically reliable and proportionally representative sampling at both gewog and chiwog levels.

3.2.4. Co-design

In Patsaling gewog, the co-design process for developing the human–wildlife conflict (HWC) management strategy adopted a participatory approach to ensure that the proposed interventions were closely aligned with the needs, experiences, and perspectives of local communities. The process

was conducted from 13 July to 19 July 2025 and involved systematic public consultations across all five chiwogs of the gewog.

A total of 139 community members participated in the consultation meetings, of which 44.60% (n = 62) were female and 55.39% (n = 77) were male (Table 2). Consultations were held separately in each chiwog to promote inclusive participation and active engagement of local stakeholders in the strategy development process. This participatory approach ensured representation of diverse viewpoints and provided a platform for community members to express their concerns, priorities, and observations related to human–wildlife conflict. The discussions generated valuable grassroots-level insights, capturing local knowledge, lived experiences, and key challenges faced by communities in managing human–wildlife interactions.

Table 3: Participants from each chiwog during the consultation meeting

Chiwog	Female	Male	Total participants
Patsaling Maed	7	7	14
Patsaling Toed	7	11	18
Pangthang	6	12	18
Thakorling	13	20	33
Chhudzomsa	29	27	56
Grand Total	62	77	139

The conclusions of the C2C test were shared during the consultation meetings which allowed for the 'data' to be integrated with the day-to-day lives of the community members. Such a participatory process not only affirmed the results of the assessment but also widened the vision of the participants on the extent and nature of the human wildlife conflict (HWC) issues that they are living. With the C2C assessment and input from the consultations in mind, group members worked with the project manager to jointly develop appropriate mitigation measures. This participatory approach helped to make the strategies tailor-made, sensitive to culture, and collective responsibility of the people. Therefore, comprehensive approaches were developed that responded to the respective needs as they were delineated within each chiwog.

4. Results and Discussions

4.1. Demography and Social Information

The demographic profile of community members was important to capture diverse perspectives within the community. The sample consists of 53.90% male respondents (n = 152) and 46.09% female respondents (n = 130), reflecting a slightly higher representation of males compared to females. Within the age group, the majority of respondents (n = 137) were in the age group of 41–60 years, followed by (n = 87) in the age group 18-40 years and (n=60) over 60 years old.

Regarding the level of education, approximately 46.61% of the respondents (n = 131) were completely uneducated. This was followed by those who had attained education at the primary level (28.46%, n =80), secondary level (19.21%, n = 54, Non-Formal Education-NFE (4.98%, n = 14) and tertiary level (0.7%, n = 2). Such demographic data traces the social structure of the community in which people live, and this is important for designing specific and practical strategies aimed at the mitigation of Human-Wildlife Conflict (HWC).

A significant number of respondents (n=203) have lived in their community for >20 years, demonstrating a deep-rooted connection to the area. Agriculture is the primary source of livelihood for the maximum respondents, followed by Livestock farming, while others relied on family support, casual labor, business/ trade, transport providers, paid employment, and other sectors. The severe negative impact of HWC is extensive crop losses, while some respondents reported livestock loss, property damages, personal injuries, and disruption to other income generating activities.

4.2. Overall Results for Patsaling Gewog

4.2.1. Conflict Species of Gewog

Figure 3 presents the perception scores of various wildlife species by two stakeholder groups: Duty Bearers/Service Providers and Community Members/Rights Holders. Overall, both groups reported relatively high concern levels for species such as bears, capped Langurs, procupine, barking deer and sambar as most conflict species in the gewog. Community members rated capped langurs and bears among the highest, indicating significant perceived impact or conflict. Duty Bearers showed high concern for species likeporcupine, and sambar. Some species, such as rodents and civets were identified as frequent conflict species.

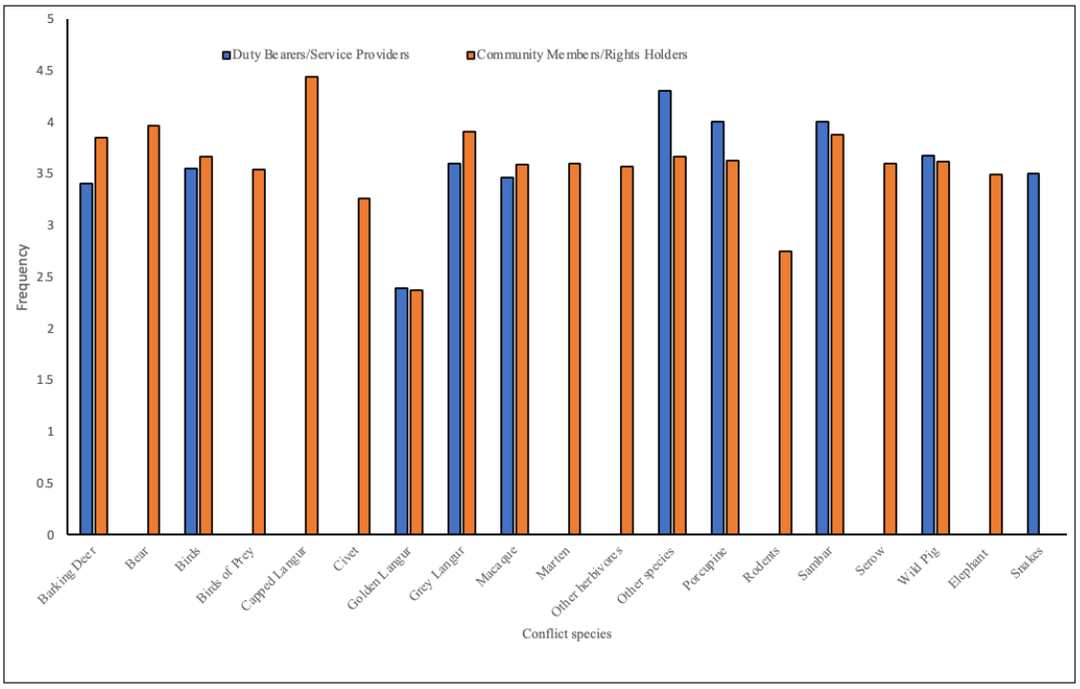

Figure 3: Conflict Species recorded in the gewog

4.2.2. Results by Outcome

This section provides a detailed analysis of how different stakeholders perceive the impact of human-wildlife interactions in the gewog and it evaluates four key outcomes: People, Livelihoods/Assets, Wildlife, and Habitat. Each outcome is assessed based on responses from two groups: the Service Providers/Duty Bearers, and Community Members. The scores for these outcomes reflect the stakeholders' perceptions and experiences regarding coexistence with wildlife. The interconnected outcome ratings across four domains People, Livelihoods/Assets, Wildlife, and Habitat showed patterns of perceived vulnerability and disparity between stakeholder groups (Figure 4). Among duty bearers, the lowest mean score was recorded for Livelihoods/Assets (3.26), while the highest was for Habitat (3.72). A similar trend was observed among community members, who rated Livelihoods/Assets lowest (3.05) and Habitat highest with (3.44).

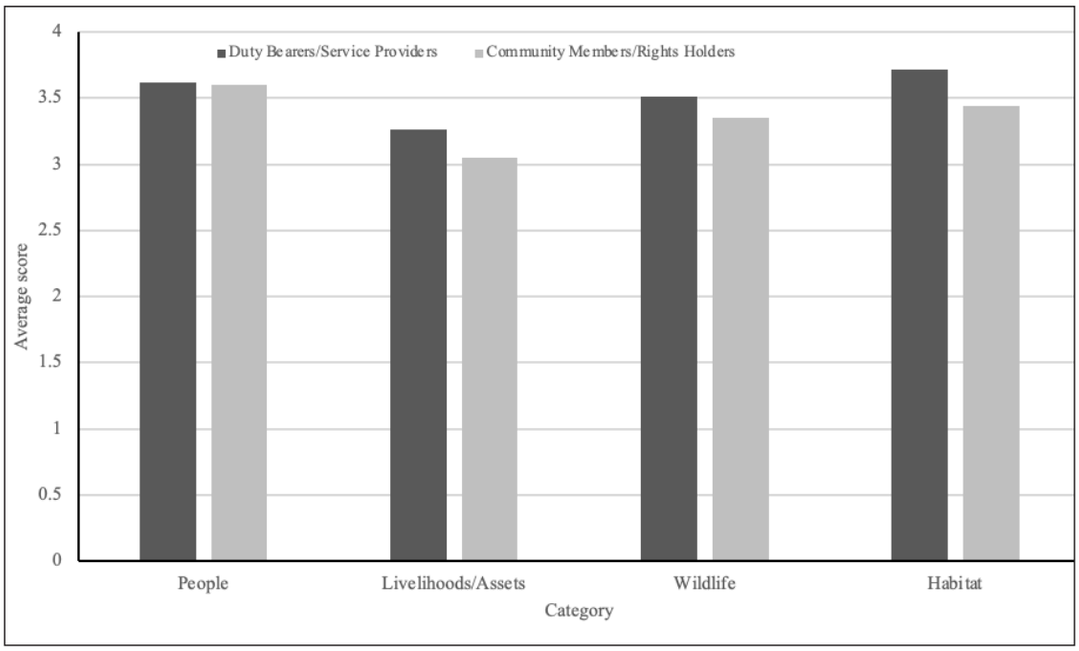

Figure 4: Graphical representation of Result by Outcome for the gewog

Both respondents' groups showing the greatest concern for livelihood-related vulnerabilities and more favorable perceptions in habitat and wildlife. The consistently low scores for Livelihoods/Assets across both groups indicate a shared recognition of economic vulnerability arising from HWC. However, the livelihood/assets outcome received the lowest scores, particularly among community members, indicating a critical vulnerability in economic and food security linked to HWC Thus, there is a need for enhanced intervention strategies focusing on community-based asset protection and livelihood diversification.

4.2.3. Results by Element

i. People- *Able and Willing to Live Alongside Wildlife*

Livelihoods and assets continue to represent the most vulnerable outcome domain in Patsaling gewog. Community members and duty bearers both rated this domain the lowest among the four outcomes, with particularly poor scores for Mitigation (3.15 by duty bearers; 2.32 by community members). Prevention also received low ratings (3.01), reflecting perceived inadequacies in active prevention measures.

Although slightly higher scores (Figure 9) were observed for Monitoring (4.07) and Response (3.71), the overall trend shows insufficient support systems and a lack of targeted livelihood protection mechanisms. There is an urgent need to implement scalable conflict mitigation tools, such as electric fencing, improved livestock enclosures, and crop insurance schemes. Community engagement in planning and executing these interventions will be essential for long-term efficacy

ii. Livelihoods/Assets- *Secured Against the Presence of Wildlife*

This outcome showed comparatively favorable perceptions, particularly among community members who rated Understanding Interactions (4.43) and Monitoring (3.37) the highest (Figure 9). This suggests a strong willingness to coexist and a relatively informed understanding of wildlife behaviors and risk factors.

The community members rated Mitigation low (2.78), indicating persistent safety concerns and a critical lack of effective protection measures. The Policy and Response elements also scored low, indicating room for strengthening risk education, communication protocols, and preventive immediate response during HWC conflict.

iii. Wildlife- *Thrives Alongside People*

The Wildlife outcome was perceived as relatively robust. Both service providers and community members reported high scores for Understanding Interactions (4.59; 4.71, respectively) and Policy (3.22; 324). These scores demonstrate shared commitment to the protection and coexistence of wildlife populations. However, element Prevention (2.96; 2.96) showed lower performance by both the respondents, suggesting weaknesses in proactive measures to deter conflict. Despite this, the relatively high scores across all other elements indicate an enabling environment for wildlife conservation.

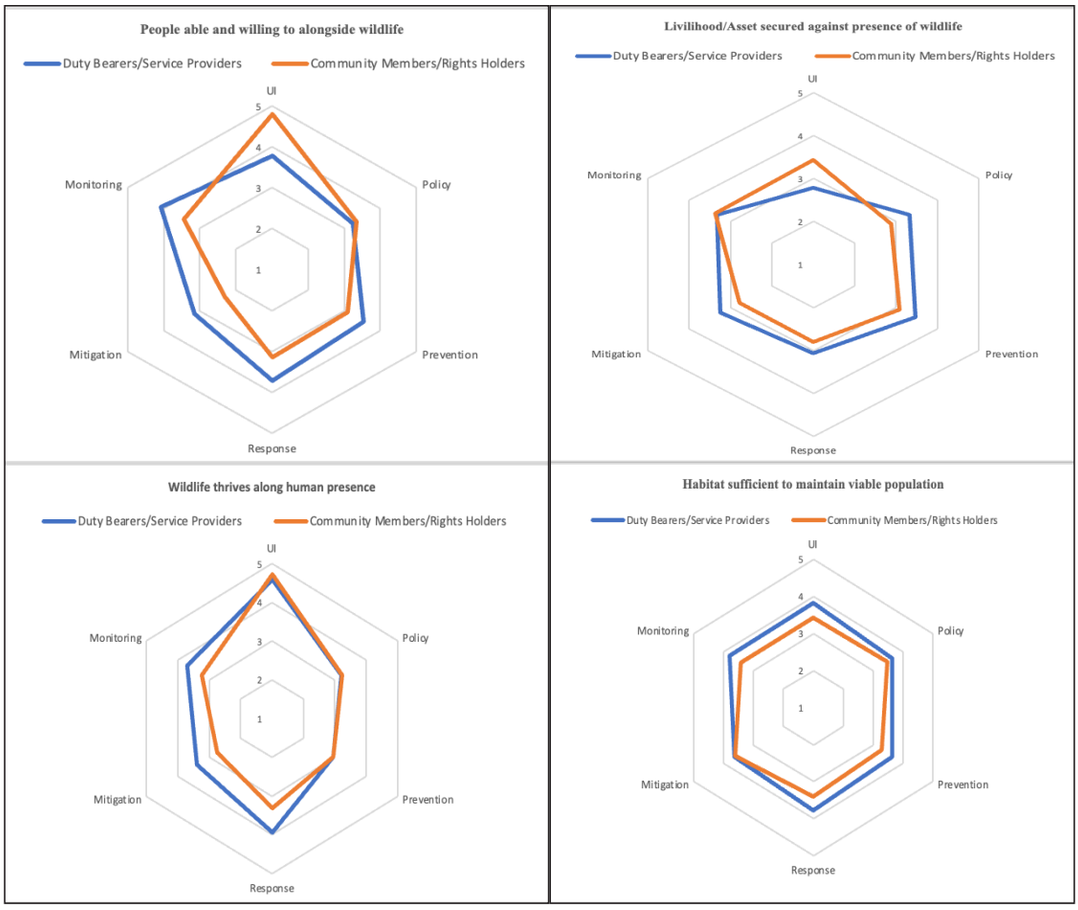

Figure 5: Graphical presentation of Results by Elements for the gewog

iv. Habitat- *Sufficient to Ensure Sustainable Wildlife Populations*

Habitat related outcomes received some of the highest scores across all outcome domain particularly from duty bearers (Figure 5). Remarkably, the scores for Mitigation (3.64), Monitoring (3.79), Understanding interactions (3.82), and Response (3.77) were reflecting recognition of habitat management, forest protection programs, willingness to coexist and enforcement efforts. Community members reported average scores across in all elements, but slightly low scores with prevention (3.29) showing a perceptual gap.

The difference in scores may reflect limited community involvement or communication in habitat stewardship initiatives. To address this, it is recommended that habitat management programs integrate participatory mapping, local surveillance schemes, and educational outreach to enhance shared ownership of conservation efforts.

4.3. Chiwog-wise Results

4.3.1. Patsaling Maed Chiwog

The chiwog wise results by conflict species and outcome are presented as follows.

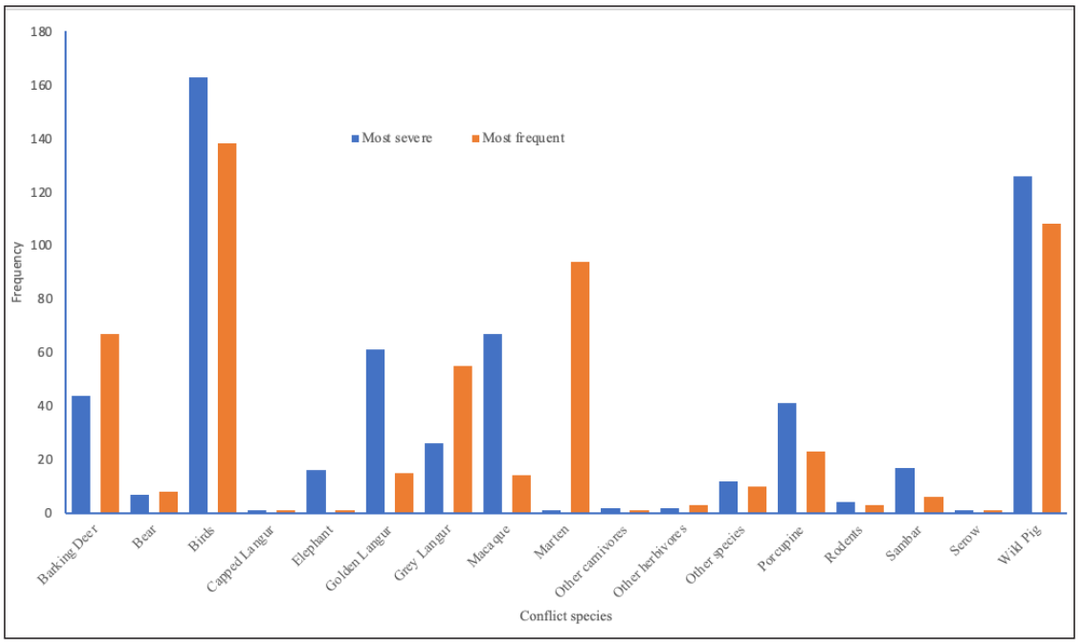

Figure 6: Graphical presentation of Result by Conflict Species of Patsaling Maed chiwog

The respondents identified birds, wild pigs/wild boars, and macaques are among the leading species causing the most severe and frequent wildlife conflicts. Birds recorded the highest number of severe (163) and frequent (138) incidents, followed by wild pigs/wild boars (126 severe, 108 frequent),

showing widespread and impactful disturbances. Macaquesandgolden langurs also show high severity, while martensare notable for high frequency (94 incidents) despite low severity. The presence of elephants, porcupines, andgrey langurs further reflects the diverse range of conflict-prone species. These trends highlight the importance of targeted mitigation strategies focusing on the most problematic species to reduce human-wildlife conflict.

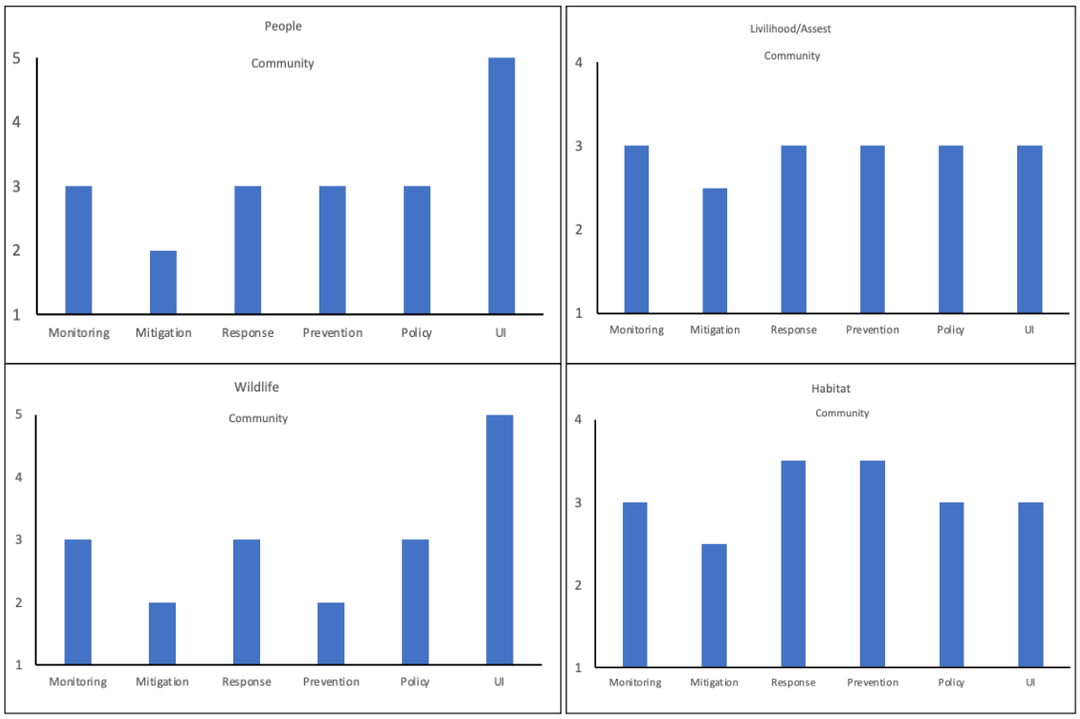

Figure 7: Graphical presentation of Result by Elements for Patsaling Maed chiwog

The graph illustrates the role of six elements (policy, understanding interactions, mitigation, response, prevention, and monitoring) in impacting four outcomes—people, livelihoods/assets, wildlife, and habitats in Patsaling Chiwog due to human-wildlife conflict. Shorter bars indicate elements with the highest impact on each outcome.

1. **People:** The shortest bar corresponds to *Mitigation*, indicating that inadequate or ineffective mitigation measures have the greatest impact on people. This may reflect challenges in implementing strategies to protect human safety or reduce human-wildlife interactions effectively.
2. **Livelihood/Assets:** For livelihoods, *mitigation* has the shortest bar, showing that limited ineffective barriers such as electric fencing and crop protection measures.
3. **Wildlife:** The element *Mitigation* again has the shortest bar, suggesting that poor mitigation efforts, such as ineffective wildlife corridors or conflict prevention measures, significantly increase the risks faced by wildlife, such as retaliatory killings or injuries.

4. **Habitat:** The shortest bar corresponds to *Prevention*, highlighting that the lack of preventive measures, such as habitat conservation or protection efforts, leads to habitat degradation and increased vulnerability to human activities.

Mitigation emerges as a critical gap affecting both people and wildlife, while understanding interactions and prevention are significant factors for livelihoods and habitats, respectively. Addressing these weaknesses through targeted interventions can help reduce the overall impact of human-wildlife conflict in Patsaling Maed Chiwog.

4.3.2. Pangthang Chiwog

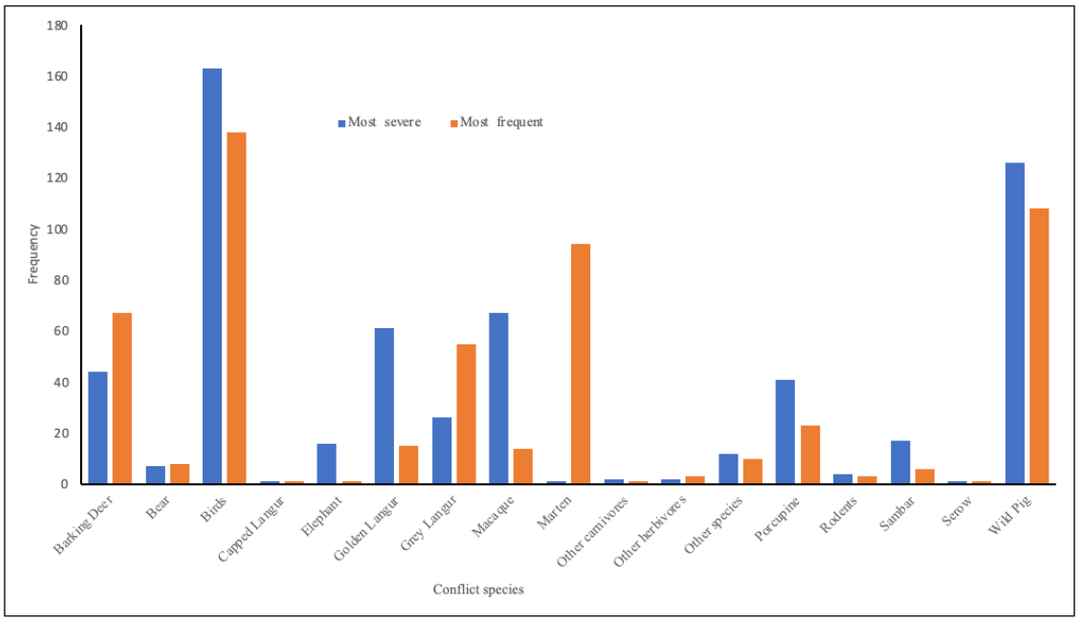

Figure 8: Graphical presentation of Result by Conflict Species of Pangthang chiwog

The data reflects the extent and frequency of wildlife-induced injuries or damages across various species. Birds stand out as the most impactful species, both in terms of severity (163 incidents) and frequency (138 incidents), likely due to their widespread presence and crop damage. Wild pigs/boars also contributed significantly, with 126 severe and 108 frequent cases, suggesting a high level of conflict due to crop raiding.

Other notable contributors include Macaques (67 severe, 14 frequent) and Golden Langurs (61 severe, 15 frequent), indicating considerable localized damage. Interestingly, Marten showed very high frequency (94) but very low severity (1), suggesting regular but minor disturbances. BarkingDeer showed moderate to high figures (44 severe, 67 frequent), possibly linked to browsing impacts. In contrast, species like Capped Langur, Serow, and Other Carnivores had minimal involvement, indicating either lower population densities or

less human-wildlife interaction. The presence of Elephants(16 severe) and Sambar(17 severe) with relatively low frequencies suggests sporadic but intense incidents.

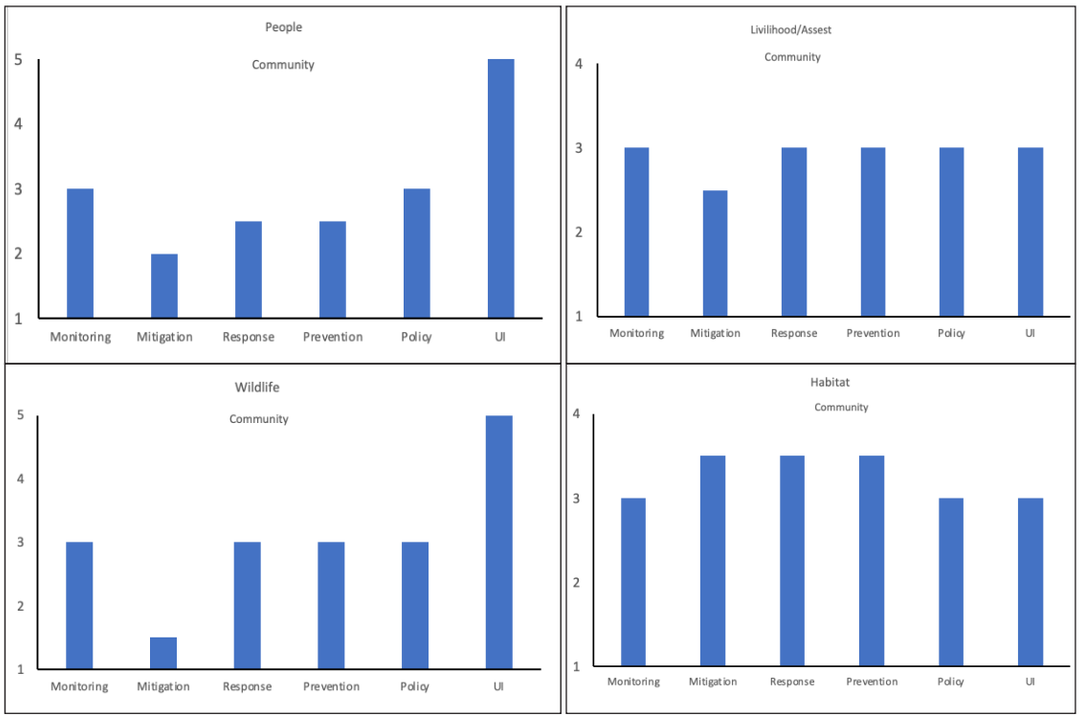

Figure 9: Graphical representation of Result by Elements for Pangthang chiwog

The bar graph illustrates the role of six elements (policy, understanding interactions, mitigation, response, prevention, and monitoring) in impacting four outcomes (people, livelihoods/assets, wildlife, and habitats) in Pangthangchiwog due to human-wildlife conflict. Shorter bars indicate elements with the highest impact on each outcome.

1. **People:** The shortest bar corresponds to *Mitigation*, indicating that inadequate or ineffective mitigation measures have the greatest impact on people. This may reflect challenges in implementing strategies to protect human safety or reduce human-wildlife interactions effectively.
2. **Livelihood/Assets:** For livelihoods, *mitigation* has the shortest bar, showing that limited ineffective barriers such as electric fencing and crop protection measures.
3. **Wildlife:** The element *Mitigation* again has the shortest bar, suggesting that poor mitigation efforts, such as ineffective wildlife corridors or conflict prevention measures, significantly increase the risks faced by wildlife, such as retaliatory killings or injuries
4. **Habitat:** *Understanding Interaction* has the shortest bar, showing that limited knowledge or awareness of wildlife behavior and interactions exacerbates the impact on habitat management.

4.3.3. Patsaling Toed Chiwog

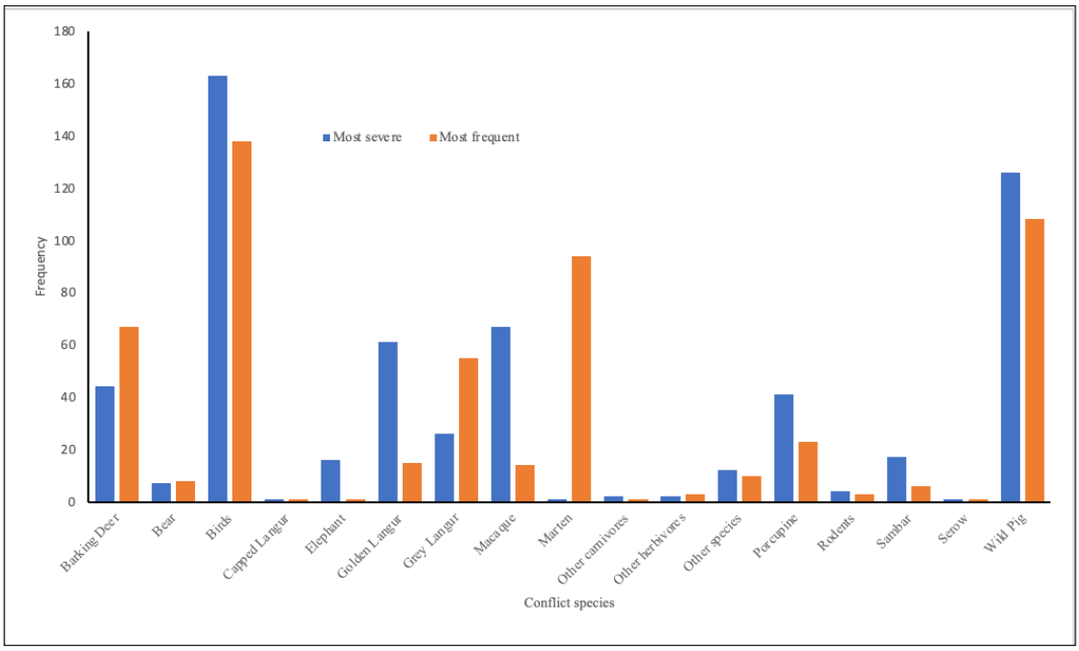

Figure 10: Graphical presentation of Result by Conflict Species of Patsaling Toed chiwog

The data indicates that birdsand wild pigs/wild boars are the leading contributors to wildlife-related damage, both in terms of severity and frequency. Birdsrecorded the highest number of severe (163) and frequent (138) incidents, followed by wild pigs/wild boars with 126 severe and 108 frequent cases. Other significant species include macaques, golden langurs, barking deer, and grey langurs, showing varying levels of impact. Martenswere notable for high frequency (94) but low severity, suggesting recurring low-level disturbances. Large mammals like elephantsand bearscaused fewer incidents but with high severity, indicating serious but infrequent damage.

Overall, the data emphasizes the need for targeted conflict mitigation strategies focused on the most impactful species—particularly birds, wild pigs, and primates.

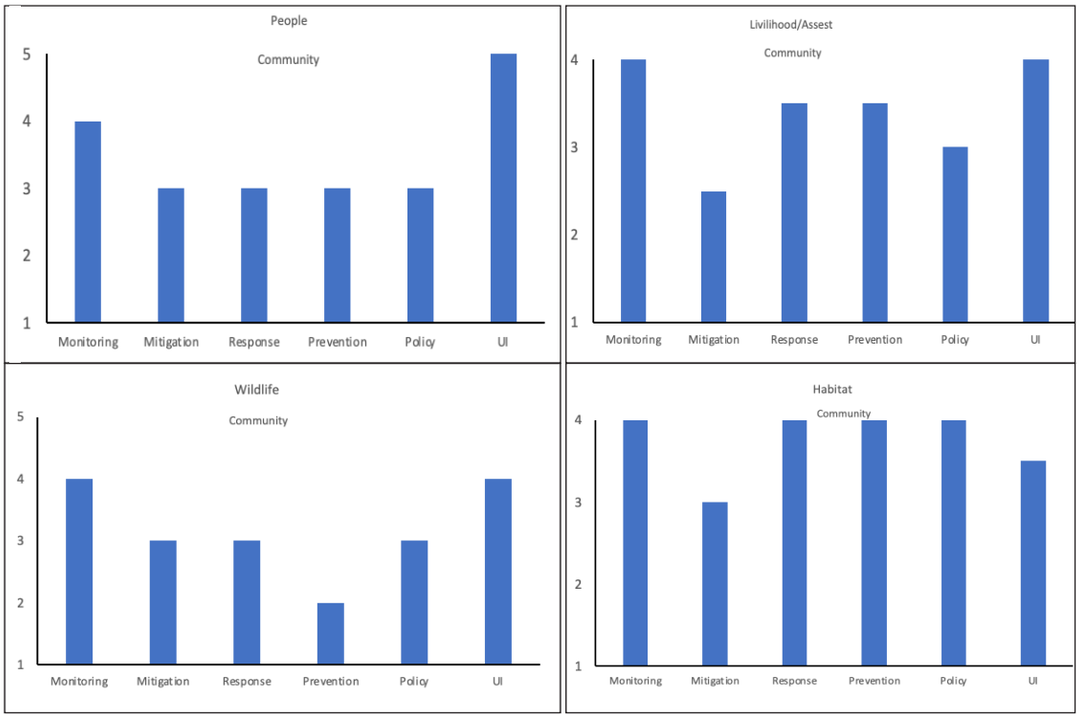

Figure 11: Graphical representation of Result by Elements for Patsaling Toed chiwog

The bar graph illustrates the role of six elements (policy, understanding interactions, mitigation, response, prevention, and monitoring) in impacting four outcomes (people, livelihoods/assets, wildlife, and habitats) in PastalingToed chiwog due to human-wildlife conflict. Shorter bars indicate elements with the highest impact on each outcome.

5. **People:** The shortest bar corresponds to *Mitigation*, indicating that inadequate or ineffective mitigation measures have the greatest impact on people. This may reflect challenges in implementing strategies to protect human safety or reduce human-wildlife interactions effectively.
6. **Livelihood/Assets:** For livelihoods, *Understanding Interaction* has shortest bar, showing that limited knowledge or awareness of wildlife behavior and interactions exacerbates the impact on economic activities, such as farming and livestock rearing.
7. **Wildlife:** The element *Mitigation* again has the shortest bar, suggesting that poor mitigation efforts, such as ineffective wildlife corridors or conflict prevention measures, significantly increase the risks faced by wildlife, such as retaliatory killings or injuries.
8. **Habitat:** The shortest bar corresponds to *Prevention*, highlighting that the lack of preventive measures, such as habitat conservation or protection efforts, leads to habitat degradation and increased vulnerability to human activities.

The livelihood/assets remain the most vulnerable outcome in Patsaling toed Chiwog, as assessed by both community members and duty bearers. This indicates that there is a persistent challenge in protecting agricultural and livestock-based livelihoods from wildlife incursions

4.3.4. Thakorling Chiwog

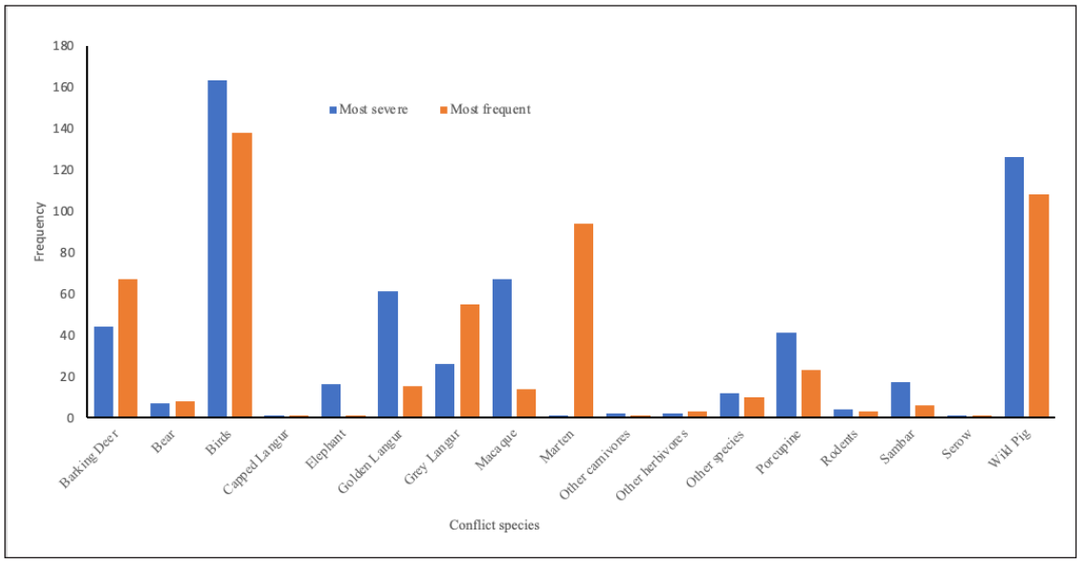

Figure 12: Graphical presentation of Result by Conflict Species of Thakorling chiwog

The graph highlights both the most severe and most frequent wildlife-related damage incidents caused by various species. Among all, birdsstand out with the highest number of both severe(163)andfrequent (138) incidents, suggesting they are a major contributor to ongoing conflict or damage. Wild Pigs/Wild Boars also caused significant impact, with 126 severeand 108frequentinstances, marking them as another major species of concern. Macaques, Golden Langurs, and Grey Langurs also contributed notably, especially in terms of severity and frequency from Macaques (67 severe) and Grey Langurs (55 frequent). Marten showed a unique pattern with only 1 severe case but an exceptionallyhigh frequency (94 incidents), indicating consistent but low-intensity interactions.

Barking Deer, Porcupine, and Sambar also show up with moderate severity and frequency, whereas Rodents, Other Carnivores, and Other Herbivores had a relatively lower impact. Large mammals like Elephantsand Bears had a smaller number of reported events but are often associated with high-impact damage. This distribution emphasizes the need for species-specificconflict mitigation strategies, with priority on birds, wild boars, and macaques due to their higher interaction levels with human activities.

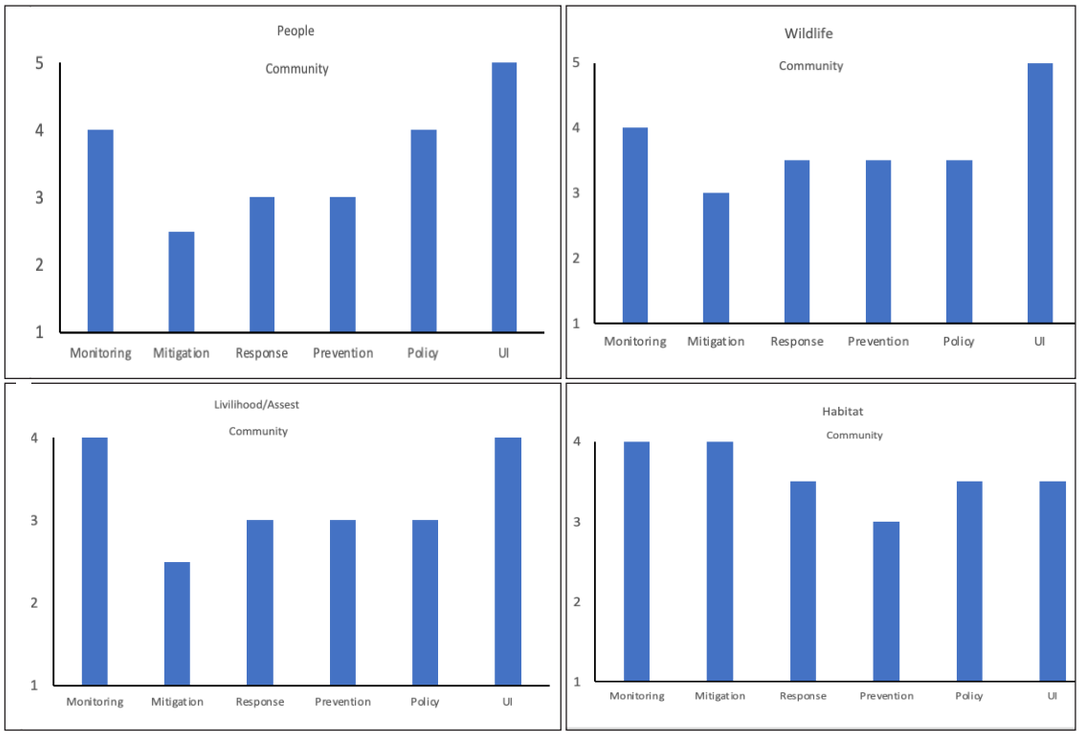

Figure 13: Graphical presentation of Result by Elements for Thakorling chiwog

Figure 13 illustrates the role of six elements (policy, understanding interactions, mitigation, response, prevention, and monitoring) in impacting four outcomes (people, livelihoods/assets, wildlife, and habitats) in Thakorlingchiwog due to human-wildlife conflict. Shorter bars indicate elements with the highest impact on each outcome.

1. **People:** The shortest bar corresponds to *Mitigation*, indicating that inadequate or ineffective mitigation measures have the greatest impact on people. This may reflect challenges in implementing strategies to protect human safety or reduce human-wildlife interactions effectively.
2. **Livelihood/Assets:** For livelihoods, *Understanding Interaction* has the shortest bar, showing that limited knowledge or awareness of wildlife behavior and interactions exacerbates the impact on economic activities, such as farming and livestock rearing.
3. **Wildlife:** The element *Mitigation* again has the shortest bar, suggesting that poor mitigation efforts, such as ineffective wildlife corridors or conflict prevention measures, significantly increase the risks faced by wildlife, such as retaliatory killings or injuries.
4. **Habitat:** The shortest bar corresponds to *Prevention*, highlighting that the lack of preventive measures, such as habitat conservation or protection efforts, leads to habitat degradation and increased vulnerability to human activities.

This outcome trend indicates that interventions should primarily aim at securing livelihoods—especially agriculture and livestock, through locally appropriate and sustainable strategies. Measures such as predator-proof livestock enclosures, crop protection fences, and compensation schemes could be prioritized.

4.3.5. Chhudzomsa Toed Chiwog

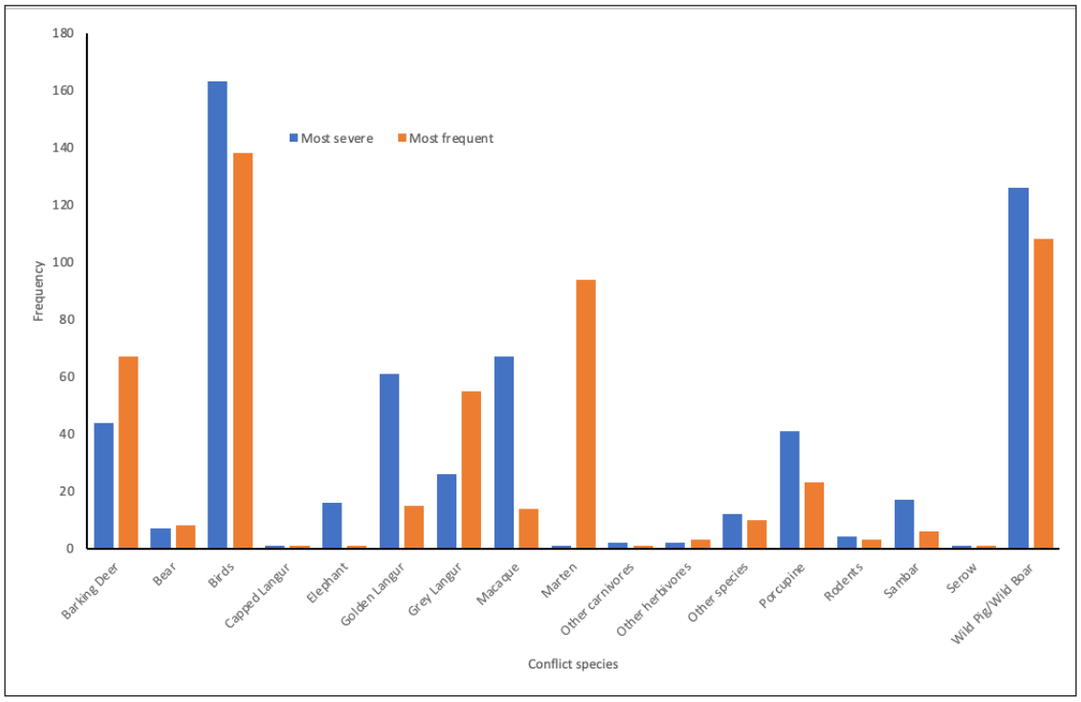

Figure 14: Graphical presentation of Result by Outcome for Chhudzomsa chiwog

The respondents identify that birds andwild pigs/wild boars are the most significant contributors to wildlife-related damage, both in terms of severity and frequency. Birds caused the highest number of severe (163) and frequent (138) damage cases, followed closely by wild pigs/wild boars with 126 severe and 108 frequent incidents. Other notable species include macaques, goldenlangurs, andporcupines, which show high levels of severe damage, suggesting their considerable impact on crops or property. Marten, despite causing only one severe incident, recorded a high frequency (94), pointing to its consistent presence and nuisance level.

Species such as barking deer, grey langur, andsambar also showed moderate levels of both severity and frequency, while species like elephants, rodents, andcapped langurs had relatively lower impact but still contributed to overall human-wildlife conflict. Overall, the data emphasizes the need for targeted conflict mitigation strategies, particularly for birds and wild boars, and monitoring of frequently occurring but less severe species like marten.

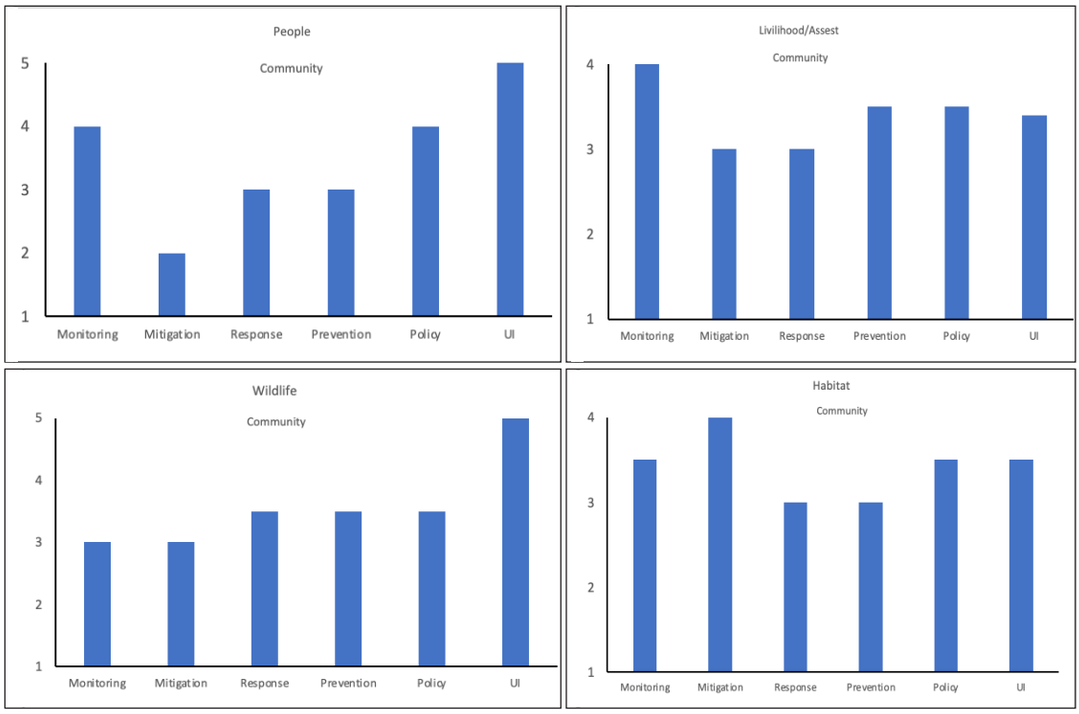

Figure 15: Graphical presentation of Result by Elements for Chhudzomsa chiwog

Figure 15 illustrates the role of six elements (policy, understanding interactions, mitigation, response, prevention, and monitoring) in impacting four outcomes (people, livelihoods/assets, wildlife, and habitats) in Chhudzomsachiwog due to human-wildlife conflict. Shorter bars indicate elements with the highest impact on each outcome.

1. **People:** The shortest bar corresponds to *Mitigation*, indicating that inadequate or ineffective mitigation measures have the greatest impact on people. This may reflect challenges in implementing strategies to protect human safety or reduce human-wildlife interactions effectively.
2. **Livelihood/Assets:** For livelihoods, "Mitigation" scoring especially low. This calls for targeted interventions that enhance mitigation strategies (e.g., fencing, deterrents), strengthen awareness, and improve policy responsiveness to ensure that livelihoods can coexist sustainably with wildlife presence
3. **Wildlife:** The element *Mitigation* again has the shortest bar, suggesting that poor mitigation efforts, such as ineffective wildlife corridors or conflict prevention measures, significantly increase the risks faced by wildlife, such as retaliatory killings or injuries.
4. **Habitat:** The shortest bar corresponds to *Prevention*, highlighting that the lack of preventive measures, such as habitat conservation or protection efforts, leads to habitat degradation and increased vulnerability to human activities.

5. Conflict to Co-existence Strategy

The assessment of human-wildlife conflict (HWC) facilitated a series of focused group discussions (FGDs) across five chiwogs, engaging 139 participants (62 males and 77 females). These discussions identified priority activities and served as a foundation for collaborative planning. Co-design, as a methodological approach, was central to this process. It emphasizes structured, participatory development that engages stakeholders equitably to analyze issues, share experiences, and develop responsive solutions. Unlike traditional needs-based models, co-design leverages community assets and expertise to co-create practical and culturally aligned interventions.

Co-design is particularly valuable in conservation programming, where long-term success requires durable partnerships and inclusive participation. By involving stakeholders in all phases of planning and implementation, this approach fosters adaptive strategies that evolve with the community's needs. Engagement in co-design goes beyond consultation; it builds trust and empowers communities as equal contributors. This ensures that conservation measures, such as those addressing HWC, are context-specific and reflect the lived experiences of those most affected.

The iterative Conflict-to-Coexistence (C2C) framework embodies co-design principles to manage HWC sustainably. The approach encompasses distinct stages: context and stakeholder analysis, HWC assessment, collaborative strategy development, implementation, and adaptive monitoring and evaluation. Each phase informs the next, ensuring culturally relevant and scientifically sound outcomes. By embedding co-design in HWC management, stakeholders collaboratively foster coexistence between humans and wildlife, laying the groundwork for lasting conservation success.

The methodology by which the actions and products described above weave together in an iterative process to ensure effective and sustainable HWC management.

The outcomes of the co-design process were presented to the relevant sectors and agencies at the Dzongkhag level. These findings were subsequently prioritized and integrated into the strategy, as detailed in the table below. The total budget outlay for the 5-year C2C Strategy (2026–2030) for Patsaling gewog is projected at **Nu.9.44 million**.

Table 4: Implementation Plan and Financial Outlays

Outcome	Activities/Action	Location	Category	Responsibility		Budget Estimate (Nu in Million)	Source of Fund	Timeline
				Lead	Collaborators			
Livelihood/assets	1.1 Formation of Quick Response teams(QRT)	Thakorling & Chhudzomsa	Short term	DFO Tsirang	Community	0.300	WWF	2026
	1.2 Provide equipment for QRT members (raincoats, gum boots, quality torches)	All chiwogs	Short term	DFO Tsirang	community	0.200	WWF	2027
	1.3 Provide Alternative crops (cardamom, ginger, Lemon, avocado)	All chiwogs	Long term	Agri/DFO Tsirang	Community	0.300	WWF	2027 - 2029
	1.4 Chain-link fencing	Pangthang	Short term	Agri/ DFO Tsirang	Community	8.00	RGoB	2026
Habitat	2.1Establish enrichment plantation and seedling supply for CFs.	All chiwogs	Long term	DFO Tsirang	Community	0.290	RGoB	2026 - 2030
People	3.1 Conduct awareness programs on HWC	All chiwogs	Short term	DFO Tsirang	LG	0.250	RGoB	2026 - 2028
Wildlife	4.1 Enhance SMART Patrolling	All five Chiwogs of Dunglagang	Short term	DFO Tsirang	Community	0.100	RGoB	2026 - 2030
Total						9.44m		

6. Monitoring and Evaluation

Timely monitoring and evaluation of planned programs are essential to ensure the successful achievement of intended objectives. This section describes the approach for tracking and assessing the implementation of strategic actions. A detailed Monitoring and Evaluation (M&E) Plan, as presented in Table 4: Monitoring & Evaluation Framework, has been designed to align closely with the Implementation Framework. The plan incorporates specific indicators to evaluate the strategy's performance, offering a transparent basis for measuring progress. Output indicators will focus on assessing the accomplishments of the actions outlined in Section 4, promoting accountability and enabling continuous refinement during the implementation process.

6.1 Monitoring

Monitoring is a continuous evaluation process designed to offer stakeholders timely and comprehensive updates on the progress or setbacks of activities,

ensuring transparency and clarity about their implementation status. For the 5-year strategic plan, the DFO Tsirang will carry out annual monitoring to assess progress, address challenges, and ensure that planned actions remain aligned with the intended objectives.

6.2 Evaluation

The strategy plan will be evaluated twice during its implementation period to ensure its effectiveness and alignment with the set objectives. A midterm review will occur in the final quarter of the second year, followed by a final review in the last quarter of the fifth year. These evaluations will be conducted by a joint team comprising internal members from DFO, Tsirang and external representatives, including individuals from functional divisions of the DoFPS. This approach ensures a thorough and unbiased assessment of the plan's implementation and outcomes.

Table 5: Monitoring and Evaluation Framework Table 4 Monitoring and Evaluation Framework

Outcome	Output	Action	Output Indicator	Baseline	Unit	Yearly Target				
						2026	2027	2028	2029	2030
Livelihood	Secured livelihood / assets along with presence of wildlife	1.1 Formation of Quick Response teams(QRT)	2 nos QRT group formed	0	nos	2	0			
		1.2 Provide equipment for QRT members (raincoats, gum boots, quality torches)	No. of QRT equipment procured and provided to the QRT members	0	No	35			-	
		1.3 Provide Alternative crops (cardamom, ginger, Lemon, avocado)	No. of seedlings provided	0	No	500	500	500	500	500
		1.4 Chain-link fencing	No of area fenced	0	Km	8				
Habitat	Ensured sufficient habitat for wildlife	2.1Establish enrichment plantation and seedling supply for CFs.	Area of SRFL where plantation of fruit trees is established	0	Area (ha)	2	2	2	2	2
People	People abled live alongside wildlife	3.1 Conduct awareness programs on HWC	No of awareness created	2	No. of times	1	1	1	1	1
Wildlife	Wildlife thrives alongside people	4.1 Enhance SMART Patrolling	No. of patrols conducted	10	No	10	10	10	10	10

7. Conclusion

Key findings from the Conflict-to-Coexistence (C2C) assessment and community consultations highlight the complex interplay between wildlife conservation and rural livelihoods, highlighting critical issues like crop and livestock depredation, habitat degradation, and economic vulnerabilities. The Conflict-to-Coexistence (C2C) Strategy for Patsaling gewog is a comprehensive, community-driven approach to addressing Human-Wildlife Conflict (HWC). This strategy is rooted in participatory methodologies and effectively integrates local knowledge, stakeholder insights, and scientific assessments to develop culturally relevant and sustainable solutions.

The approach guarantees inclusivity and a thorough grasp of community dynamics by involving a broad population, which includes almost equal representation of men and women as well as a range of educational backgrounds. Targeted interventions, such the installation of chain-link and electric fencing, the encouragement of alternative crops, and habitat restoration projects, were made easier by the organized co-design approach, which also placed a strong emphasis on capacity-building through enhanced monitoring systems and awareness campaigns.

The C2C framework emphasizes how crucial it is for local leaders, conservation organizations, and community members to work together and share responsibilities. The results of this approach not only lessen HWC but also promote harmony between wildlife preservation and human livelihoods, opening the door to coexistence. This model can be used as a template to solve HWC in Bhutan and other similar socio-ecological environments.

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