



Human-Wildlife Conflict Management

Conflict to Coexistence (C2C) Strategy for
Dunglagang Gewog, Tsirang (2026-2030)



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



Supported by:



Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

based on a decision of
the German Bundestag



Prepared by:

Tshering Wangchuk, Sr.FR/IKI focal, Divisional Forest Office, Tsirang

Contributors:

1. Phuntsho Tobgay, Chief Forestry Officer, Divisional Forest Office, Tsirang
2. K.N Ghimeray, Sr. Forest Ranger I, Divisional Forest Office, Tsirang
3. Tashi Choden, Forestry Officer, Divisional Forest Office, Tsirang

Reviewers:

1. Kinley Dem, Chief Forestry Officer, FMID, DoFPS
2. Tashi Norbu Waiba, Principal Forestry Officer, FRPMD, DoFPS
3. Rinchen Namgay, Dy. Chief Forestry Officer, UWIFoRT, DoFPS
4. Kinga Norbu, Dy. Chief Forestry Officer, FMID, DoFPS
5. Tshering Zam, Principal Forestry Officer, NCD, DoFPS
6. Phub Dorji, Sr. Forestry Officer, NCD, DoFPS

Citation:

Divisional Forest Office (DFO), Tsirang, 2026. Conflict to Co-existence Strategy for Dunglagang Gewog, DoFPS, MoENR.

Reviewed and endorsed by the 78th session of the TAC meeting held on 16th-17th February 2026.

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Abbreviations

BPCL	Bhutan Power Corporation Limited
BHU	Basic Health Unit
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	Renewable Natural Resources
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
Department of Forests and Park Services
Thimphu: Bhutan



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 Dunglagang 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 Dunglagang 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 coexistence. I would like to express my heartfelt appreciation to the communities of Dunglagang 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 Dunglagang 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 Dunglagang gewog in the years to come.

Contents

Foreword	4
Acknowledgement	5
1. Introduction	8
2. Goal and Objectives	9
3. Methodology	9
3.1. Site Description	9
3.2 Methods: C2C Framework	10
3.2.1. Context Screening	11
3.2.2. Stakeholder Identification and Analysis	12
3.2.3 HWCAssessment	14
3.2.4. Co-design	15
4. Results and Discussions	16
4.1. Demography and Social Information	16
4.2. Overall Results for Dunglagang Gewog	16
4.2.1. Conflict Species of Gewog	16
4.2.2. Results by Outcome	17
4.2.3. Results by Element	18
4.3. Chiwog-wise Results	20
4.3.1. Dangreybu Maed Chiwog	20
4.3.2. Lhamoilium Chiwog	22
4.3.3. Norjansa Chiwog	24
4.3.4. Kherithang Chiwog	26
4.3.5. Dangreybu Toed Chiwog	28
5. Conflict to Co-existence Strategy	30
6. Monitoring and Evaluation	31
6.1 Monitoring	31
6.2 Evaluation	32
7. Conclusion	33
References	34

List of Figures

Figure 1: Map of the Study Area	10
Figure 2: Conflict to Co-existence Framework	11
Figure 3: Conflict Species recorded in the gewog	17
Figure 4: Graphical representation of Result by Outcome for the gewog	18
Figure 5: Graphical presentation of Results by Elements for the gewog	20
Figure 6: Graphical presentation of Result by Conflict Species for Dangreybu Maed chiwog	20
Figure 7: Graphical presentation of Result by Elements for Dangreybu Maed chiwog	21
Figure 8: Graphical presentation of result by Conflict Species for Lhamoiliumchiwog	22
Figure 9: Graphical representation of Result by Elementsfor Lhamoiliumchiwog	23
Figure 10: Graphical presentation of Result by Conflict Species for Norjansa chiwog	24
Figure 11: Graphical representation of Result by Elements for Norjansa chiwog	25
Figure 12: Graphical presentation of Result by Conflict Species of Kherithang chiwog)	26
Figure 13: Graphical presentation of Result by Elements for Kherithang chiwog	27
Figure 14: Graphical presentation of Result by Outcome for Dangreybu Toed chiwog	28
Figure 15: Graphical presentation of Result by Elements for Dangreybu Toed chiwog	29

List of Tables

Table 1: Stakeholder Analysis Matrix for Dunglagang gewog	12
Table 2: Household Survey from each chiwog under Dunglagang gewog	14
Table 3: Participants from each chiwog during the consultation meeting	15
Table 4: Implementation Plan and Financial Outlays	31
Table 5: Monitoring and Evaluation Framework Table 4 Monitoring and Evaluation Framework	32

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.

Dunglagang gewog is located in the eastern part of the dzongkhag and shares a boundary with Sarpang Dzongkhag. It is one of the least developed gewogs, but with the completion of the gewog centre road and ongoing electrification, the living standards of the people have improved. The gewog has a community school, Basic Health Unit (BHU), and one Outreach Clinic (ORC). It is also supported by agriculture, forestry, and livestock extension centres that provide RNR services to the community. Most residents depend on farming, mainly cultivating maize, wheat, and rice. However, human-wildlife conflict is a major challenge in Dunglagang gewog, as frequent crop damage and livestock losses are caused by wildlife such as wild pigs, monkeys, and leopards. According to the Socio-Economic Survey (SES) conducted in 2023, the gewog is identified as one of the high HWC hotspots, with a total of 20 conflict incidents reported over the past three years. 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 Human-wildlife conflict (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 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

The Dunlagang gewog is bordered by Kikhorthang gewog in the west, Sarpang Dzongkhag in the east, Shemjong gewog in the south and Patshaling gewog in the north. Dunlagang gewog is one of the least developed gewog in Tsirang Dzongkhag with the completion of the gewog centre road and coming up of electrification the living standard of the public has changed. The gewog has one community school, one Basic Health Unit (BHU) and one outreach clinic (ORC). The gewog also has an agriculture, forestry and livestock extension center which provides the Renewable natural resources (RNR) extension services in the gewog. The people of the gewog mainly grow maize, wheat and rice. The gewog has two suspension bridges which connect the gewog to the other gewogs.

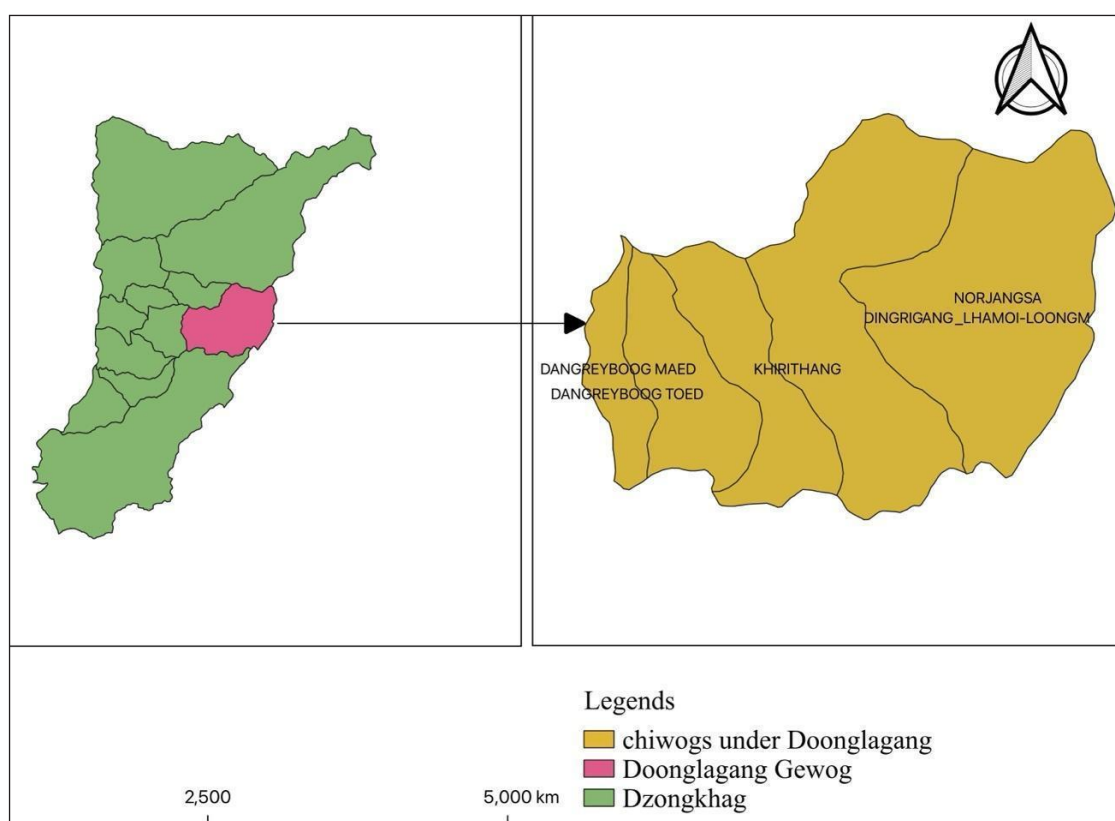


Figure 1: Map of the Study Area

3.2 Methods: C2C Framework

This strategy is developed based on the principles and methodologies of the Conflict-to-Coexistence (C2C) approach. The Conflict-to-Coexistence (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 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).

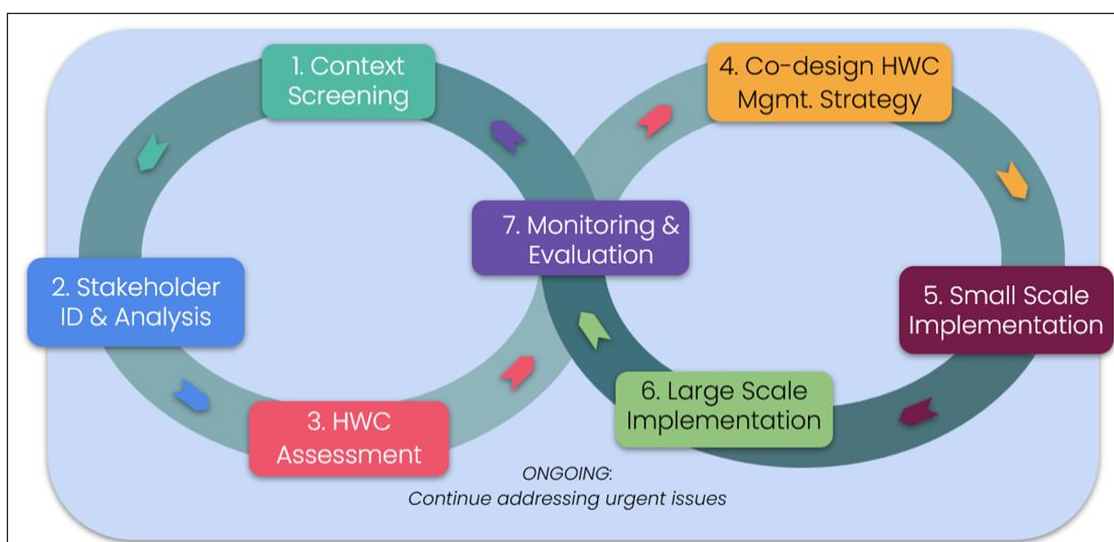


Figure 2: Conflict to Co-existence Framework

3.2.1. Context Screening

Context screening is a cornerstone for designing relevant interventions based upon knowledge of the local setting or situation in which HWC occurs. It ensures that everyone involved has a similar understanding of the situation and that the solutions created are appropriate for the people and the landscape. The context screening is the first step of the assessment process and involves identifying and understanding the details of a particular landscape and the current HWC situation. Before completing the context screening, all baseline information on the landscape were collected, and then the context screening form was completed by the C2C project manager.

Before completing the context screening, the Conflict-to-Coexistence(C2C) project manager collected all baseline information for the landscape such as social landscape mapping, government census documents, or any other resources. The Conflict-to-Coexistence (C2C) project manager also consulted colleagues, stakeholders (official of local government) within the landscape to obtain the necessary information.

Sections of the context screening include a site description (i.e., information on the landscape, human demographics, and livelihoods), trends in human-wildlife conflict (i.e., records of conflict species, frequency/severity of conflict, types of conflict, and management interventions), drivers of human-wildlife conflict (i.e., both anthropogenic and natural drivers), wildlife dynamics (i.e., trends in conflict and prey species, movement of species through the landscape, and factors that drive conflict), and policies.

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 HWC, others are involved in its management, again others are not directly affected but highly influential. For the C2C: Conflict to Coexistence-Approach it is crucial to understand who these stakeholders with regards to HWC are and how they can work together. Therefore, we formed 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 and carried out the stakeholder identification and analysis matrix.

We conducted a stakeholder analysis utilizing a stakeholder analysis matrix, where stakeholders were grouped into clusters to inform the 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 Dunglagang gewog.
- Their capacity to influence the long-term effectiveness of an HWC management plan.
- Their willingness and ability to engage in the collaborative design of the HWC management strategy.

Table 1: Stakeholder Analysis Matrix for Dunglagang gewog

Stakeholders	Interest	Influence	Category
Gup & Mangmi, Dunglagang & GAO	5	5	High interest high influence
Tshogpa (Norjangsa	5	5	
Gewog Forestry Focal	5	5	
Agriculture extension officer	5	5	
Livestock extension officer	5	5	
NA	5	5	
NC	5	5	
local communities	5	5	
Sai Tshogpa	4	5	Medium interest high influence
Bee keepers	4	5	
Dzongkhag Administration	4	5	
Gopini/Dunglagang Primary Schools	2	5	Low interest high influence
Tshogpa (Lhamoilum)	5	4	High interest medium influence
Tshogpa (Kherithang)	5	4	
Tshogpa (Dangrebutoe)	5	4	
Tshogpa (Dangrebumaed())	5	4	

Karbari/Chipon	4	4	Medium interest medium influence
CFMG Hatidengini	4	4	
CFMG Norjangsa	4	4	
CFMG Pemaling	4	4	
CFMG Norbugang	4	4	
CFMG Dangrebu	4	4	
CFMG Khorsaney	4	4	
Dairy Group	4	4	
Poultry farm owner	4	4	
Piggery farm owner	4	4	
Water user group	4	4	
Vegetable vendors	4	4	
TARAYANA	4	4	
Therma Dharma Tshogpa	3	4	Medium interest medium influence
Local healer (Paw)	3	4	
Gewog Lhakhang, Dunglagang	2	4	Low interest medium influence
Hindu MandhirKhorsani	2	4	
NFEs	2	4	
Desuung	2	4	
Bank (BDBL, BoB connects	2	4	
Bhutan Telecommunication	2	4	
BPC multi tasker	2	3	
Road User Group	2	3	
Business men/shopkeeper	2	3	
RENEW	2	3	
Tashi cell	2	3	
Red Cross Society	2	3	
ECCD	2	2	Low interest low influence
DoR	2	2	
BHU	1	1	
Furniture House	1	1	

The stakeholder analysis reveals a diverse range of interest and influence levels across groups involved in the Human-wildlife conflict (HWC) management strategy. Stakeholders with both high interest and high influence, such as local leaders (Gups and Tshogpas), Mangmi, RNR sectors, NA, NC and are key players who can significantly impact the strategy's success. Medium influence stakeholders, including Dzongkhag administration, the 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, 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 HWC management strategy.

3.2.3 HWC Assessment

The "Conflict to Co-existence" assessment in Dunglagang was conducted from 1st April to 28th March 2025. Dunglagang gewog comprises five chiwogs: Norjansa, Lhamoilium, Kherithang, DangreybuToed and DangreybuMaed. To determine an appropriate sample size from the total household population, Yamane's formula was

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

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 203 households were selected randomly from all chiwogs and interviewed out of a total of 411 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 Dunglagang gewog

Sl/No.	Name of Chiwog	HHs	No. of HHs interviewed	Sample Size
1	Dangreybu Maed	58	28	203
2	Dangreybu Toed	51	25	
3	Kherithang	86	43	
4	Lhamoilium	149	74	
5	Norjansa	67	33	
Total HHs		411	203	

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 Dunglagang gewog, the co-designing process for developing a human-wildlife conflict management strategy followed a participatory approach, ensuring that the strategies developed aligned closely with the needs and perspectives of the local communities. The process, which commenced from 13th July to 19th July 2025, involved systematic public consultations across each of the five chiwogs of the gewog.

A total of 191 community members participated in the consultation meetings, with 21.98% (n = 42) being female and 78.10% (n = 149) male (Table 2). Consultations were conducted in each chiwog to facilitate active involvement of local stakeholders in the strategy development process. This participatory approach ensured the representation of diverse perspectives, enabling community members to articulate their concerns, priorities, and observations regarding human-wildlife conflict. The discussions provided critical grassroots-level information, capturing experiential knowledge and challenges faced by the communities.

Table 3: Participants from each chiwog during the consultation meeting

Chiwog	Female	Male	Total participants
Nojansa	6	33	39
Lhamoilium	24	58	82
Kherithang	2	22	24
DangreybuMaed	4	19	23
DangreybuToed	6	17	23
Grand Total	42	149	191

The conclusions of the Conflict to Coexistence (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 Conflict to Coexistence (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 53.08% male respondents (n = 172) and 46.91% female respondents (n = 152), reflecting a slightly higher representation of males compared to females. Within the age group, the majority of respondents (n = 98) were in the age group of 41–60, followed by (n = 93) in age group 18–40 and (n=78) over 60 years old.

Regarding the level of education, approximately 56.34% of the respondents (n = 182) were completely uneducated. This was followed by those who had attained education at the primary level (22.29%, n = 72), secondary level (14.80%, n = 48, Non-Formal Education-NFE (5.26%, n = 17) and tertiary level (1.23%, n = 4). 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=186) 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 Human-Wildlife Conflict (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 Dunglagang Gewog

4.2.1. Conflict Species of Gewog

Wild animals such as monkeys, barking deer, birds, rodents, and porcupines have been identified as major conflict species in Dunglagang Gewog. According to the Conflict-to-Coexistence (C2C) assessment report, both community members and service providers/duty bearers consistently identified macaques and porcupines as the most problematic species. Macaques were rated highest by duty bearers (mean score: 4.23), while porcupines were rated highest by community members (mean score: 4.01). Birds and civets were also perceived as relatively significant conflict species by both groups. In contrast, species such as capped langur and rodents received comparatively lower ratings from the community, indicating a lesser perceived impact or lower frequency of encounters. Furthermore, community members identified serow as the least significant conflict species, while duty bearers reported golden langur as causing minimal conflict. The graphical representation of the reported conflict species is presented in Figure 3.

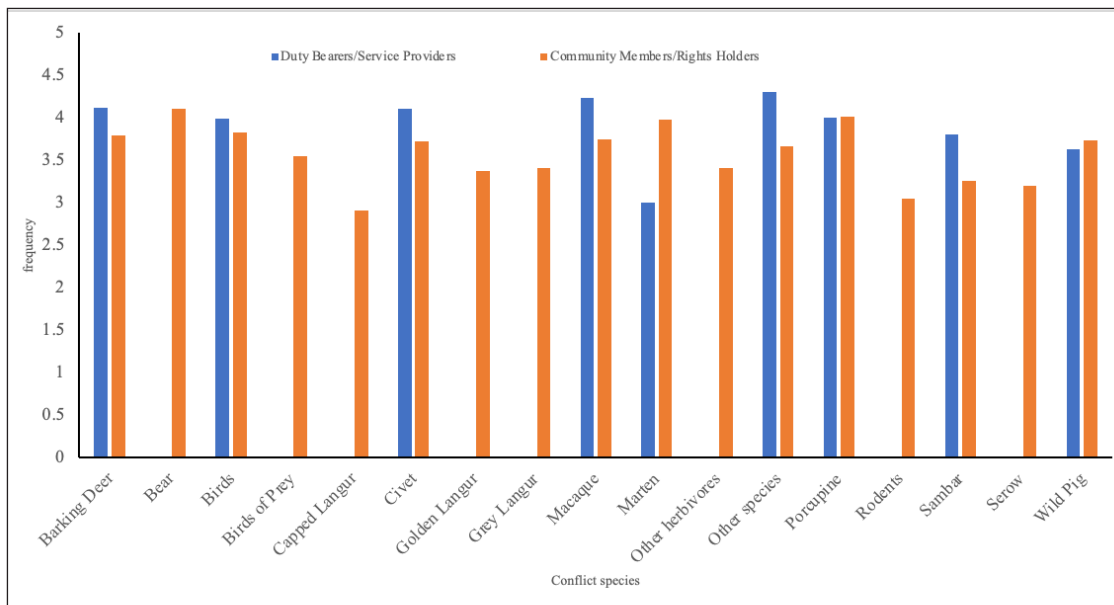


Figure 3: Conflict Species recorded in the gewog

4.2.2. Results by Outcome

The result section provides a detailed analysis of how different stakeholders perceive the impact of human–wildlife interactions in the gewog. This section 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 (3.21), while the highest was for Wildlife (3.56). A similar trend was observed among community members, who rated Livelihoods/Assets lowest (3.18) and wildlife highest with (3.59).

In Dunglelagang gewog, the current state of human–wildlife coexistence is imbalanced, primarily due to the vulnerability of livelihood assets. Both service providers and community members have reported similar outcomes, indicating that human vulnerability is next to livelihood in Dunglelagang gewog (Figure 5). This suggests that the security and safety of people's lives are more threatened by wildlife than the protection of wildlife and their habitats. Addressing this imbalance is crucial to ensure the well-being of affected communities. Livelihood assets in gewog, including agriculture, livestock, and forest resources, are below safe thresholds, indicating instability in these sectors. This instability is directly linked to interactions with wildlife, leading to increased HWCs. Farmers face challenges such as crop destruction by wild

boars and livestock predation by tigers and leopards, resulting in significant economic losses and threatening food security.

The results suggest that livelihoods and assets are perceived as the most adversely affected domains, requiring urgent attention in future human-wildlife coexistence planning. The field survey reported the lowest scores in "Livelihoods/Assets," indicating significant concerns about how wildlife impacts local economies and livelihoods. The consistently low scores in "Livelihoods/Assets" underscore the urgent need for interventions that address the economic impacts of wildlife on local communities while promoting coexistence strategies that benefit both people and wildlife populations. These findings suggest that while there is some recognition of the potential for coexistence, significant challenges remain, particularly concerning livelihoods affected by wildlife presence, which must be addressed through effective policy and community engagement strategies.

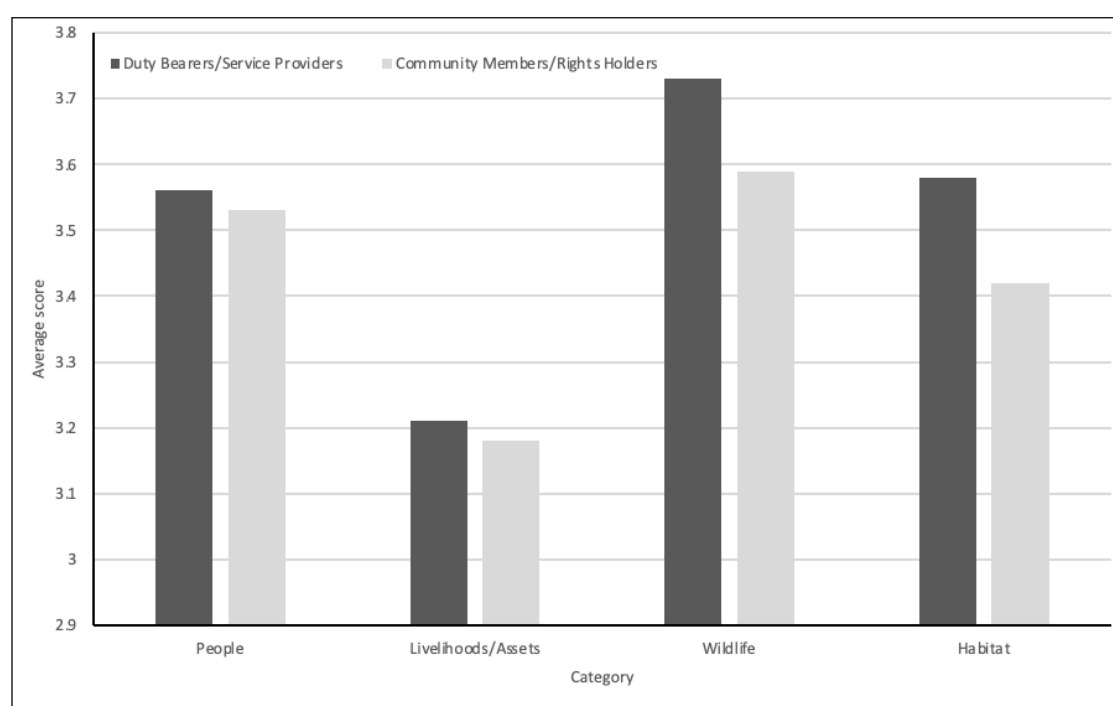


Figure 4: Graphical representation of Result by Outcome for the gewog

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 the Dunglagang gewog. Community members and duty bearers both rated this domain the lowest among the four outcomes, with particularly poor scores for Mitigation (2.57 by duty bearers; 2.45 by community members). Although slightly higher scores (Figure 5) were observed for Understanding interaction (4.43) 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 Monitoring (3.37) the highest (Figure 9). This suggests a continue enforcement effort from the Division forest office.

The community members rated Mitigation low (2.74), and policy (2.89) indicating persistent safety concerns and a critical lack of effective protection measures. The Policy elements also scored low, indicating room for strengthening risk education, communication protocols, and preventive measures.

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; 4.15, respectively) and policy (4.01; 3.24). 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.

iv. Habitat– Sufficient to Ensure Sustainable Wildlife Populations

Habitat related outcomes received some of the highest scores across all outcome domains, 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.

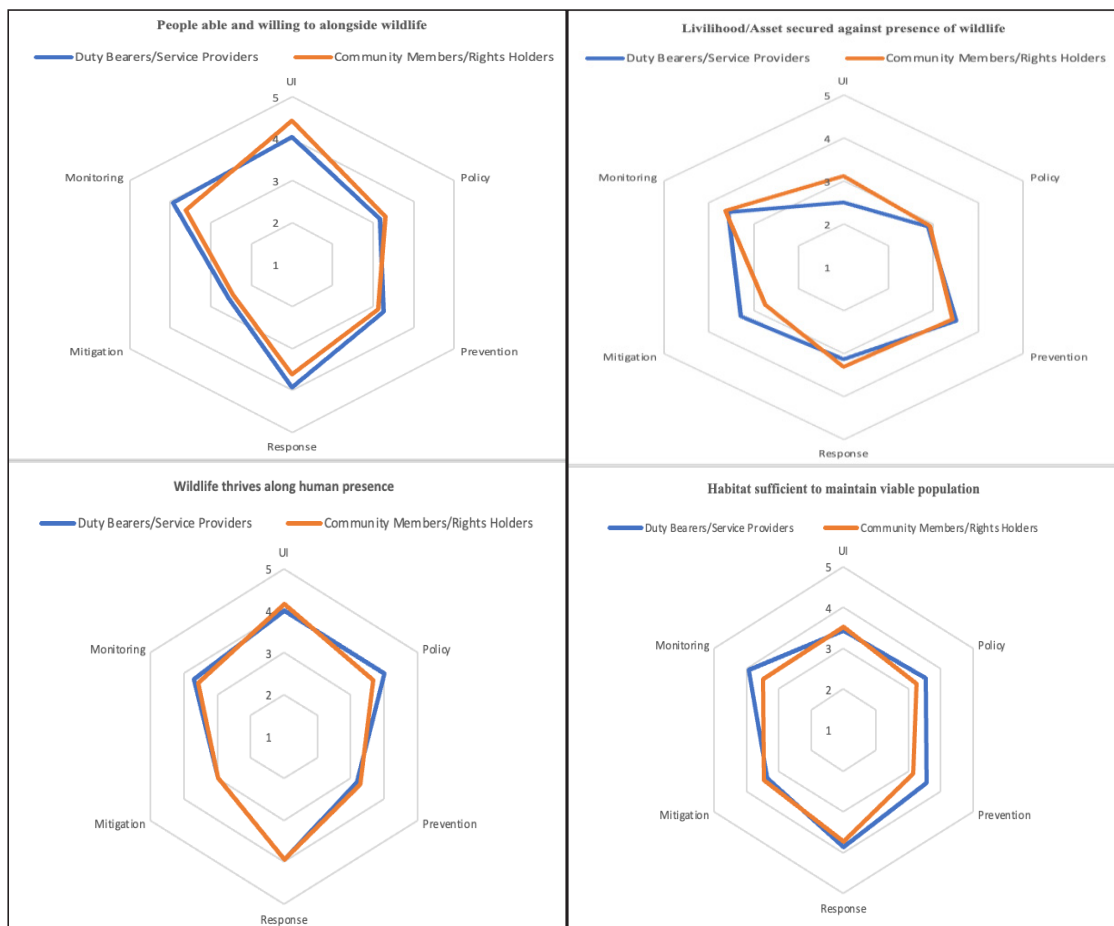


Figure 5: Graphical presentation of Results by Elements for the gewog

4.3. Chiwog-wise Results

4.3.1. Dangreybu Maed Chiwog

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

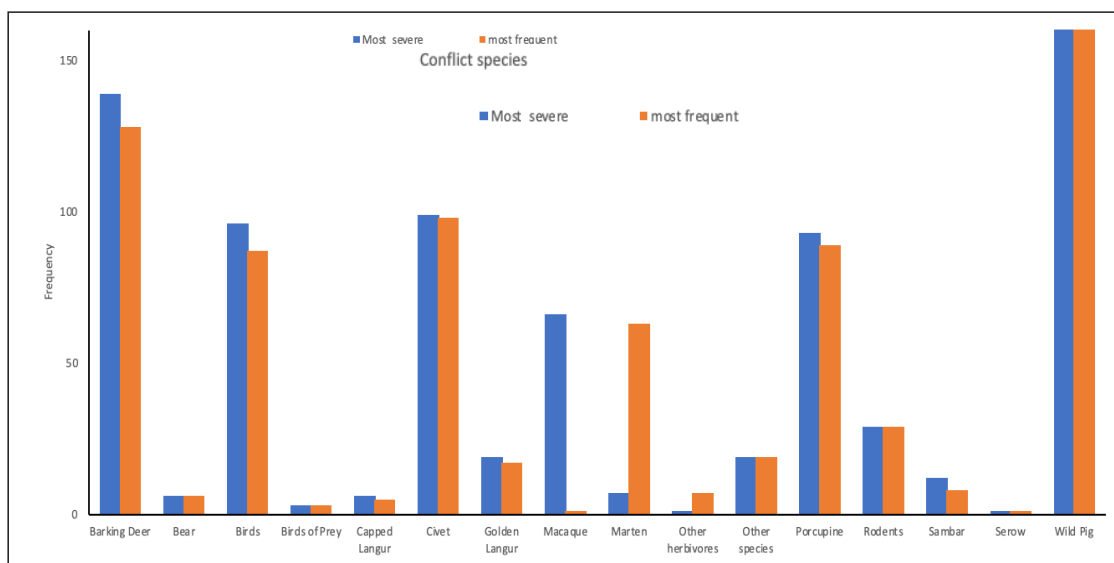


Figure 6: Graphical presentation of Result by Conflict Species for Dangreybu Maed chiwog

Respondents identified wild pig/Wild boar(n=214) as the most frequent and severe conflict species reported by community members. The other conflict species within Dangreybu chiwog was barking deer(n=128) mainly impacting crop. Civet also causes significant conflict (N=98), followed by Procupine (n=89) and birds(n=87) perceived as causing more severe conflicts by duty bearers, while community members reported higher frequency of bird conflicts. while macaques and Martin moderately affect crops. Species like Rodent, langurs, and sambar show lower conflict rates, and serow and capped Langur have minimal impact. The findings stress the need for targeted management of high-conflict species to reduce economic losses and enhance coexistence.

Respondents identified wild pig/Wild boar as the most frequent and severe conflict species, with both species reported community members. Birds and macaques followed, with Barking deer were noted less frequently but still appeared consistently across respondent groups and impact types. Hares were reported only by community members and only under the most frequent impact category. Duty bearers reported higher severity of impacts, especially for macaques and elephants, whereas community members emphasized frequency, particularly for birds and hares. These differences in perception may reflect varying experiences, where community members face frequent but less severe encounters, and duty bearers focus on more critical incidents.

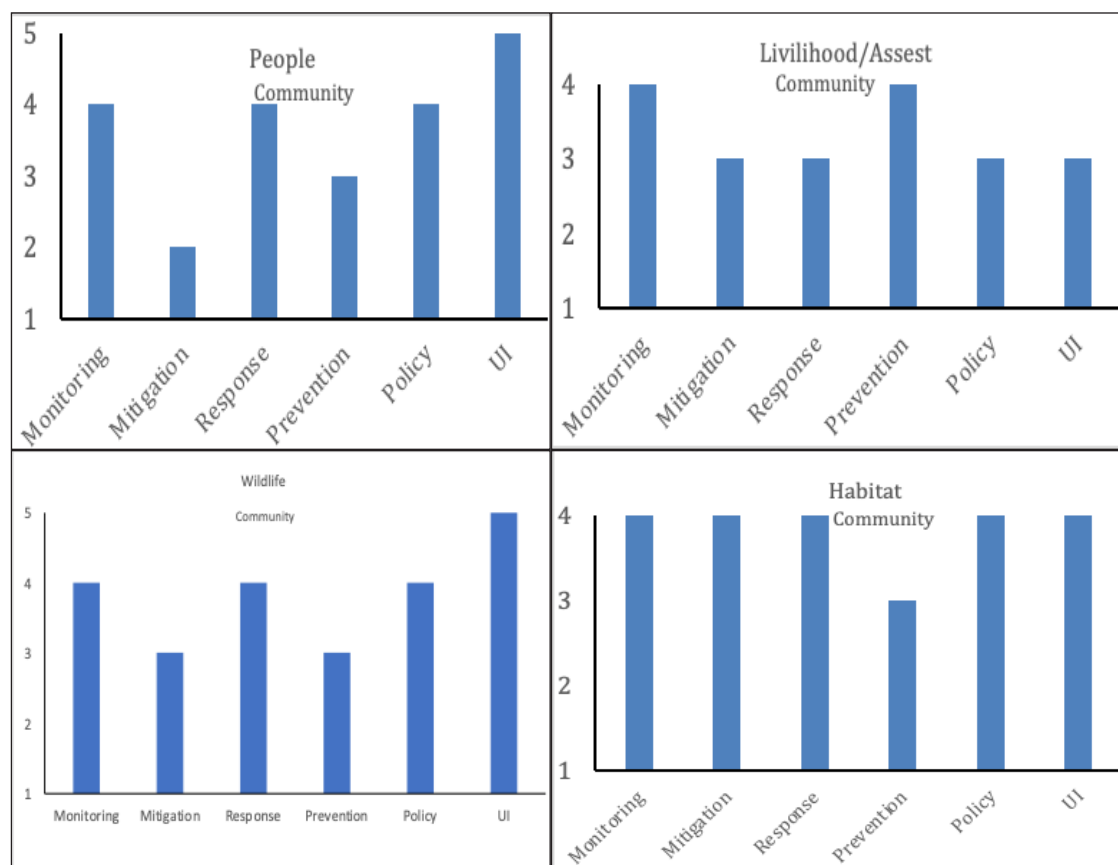


Figure 7: Graphical presentation of Result by Elements for Dangreybu Maed chiwog

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 Dangreybu Maed 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, 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.

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 Dunglagang Chiwog.

4.3.2. Lhamoilium Chiwog

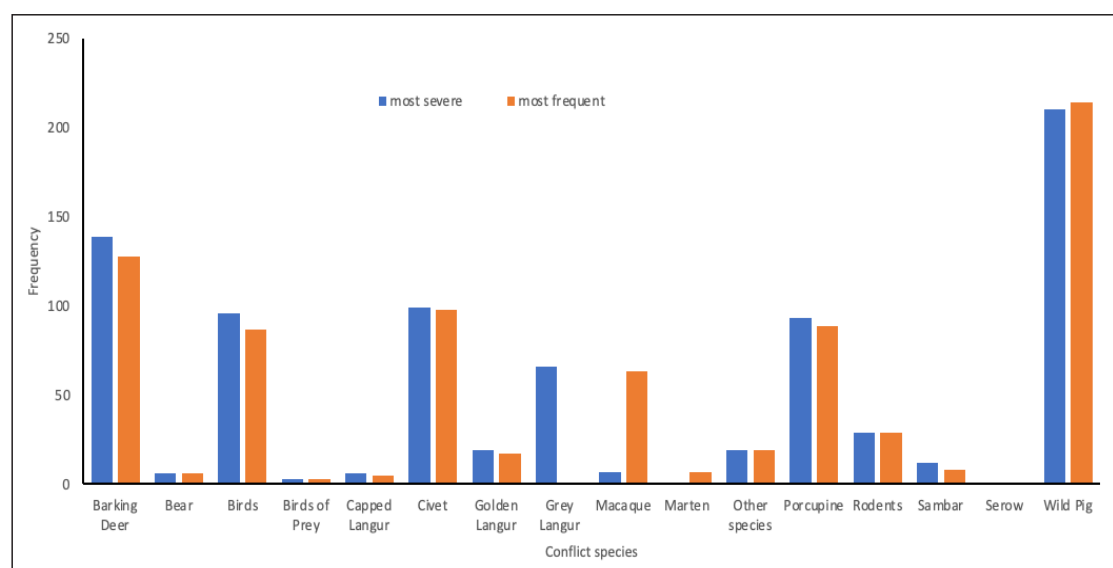


Figure 8: Graphical presentation of result by Conflict Species for Lhamoiliumchiwog

The graph highlights the frequency of human-wildlife conflicts in Lhamoilium, showing the wild Wild Pig/Wild Boar is the most problematic species, recording the highest number of both severe (n=210) and frequent (N=214) conflict incidents. Barking Deer, Civet, and Porcupine also show consistently high levels of both severity and frequency, indicating they are major contributors to human-wildlife conflict in the area. Grey Langur displays a pattern of high severity (n=66) but low frequency (n=1), suggesting that while encounters are rare, they tend to cause substantial damage when they do occur. On the other hand, species like Macaque show high frequency (n=63) but low severity (n=7), indicating frequent but relatively less damaging interactions, possibly more of a nuisance than a threat. Species such as Serow, Birds of Prey, and Bear register very low numbers in both categories, suggesting limited conflict or rare encounters. Overall, the data highlights the need for species-specific management strategies, with a focus on mitigating the impacts of high-conflict species and monitoring occasional but severe threats.

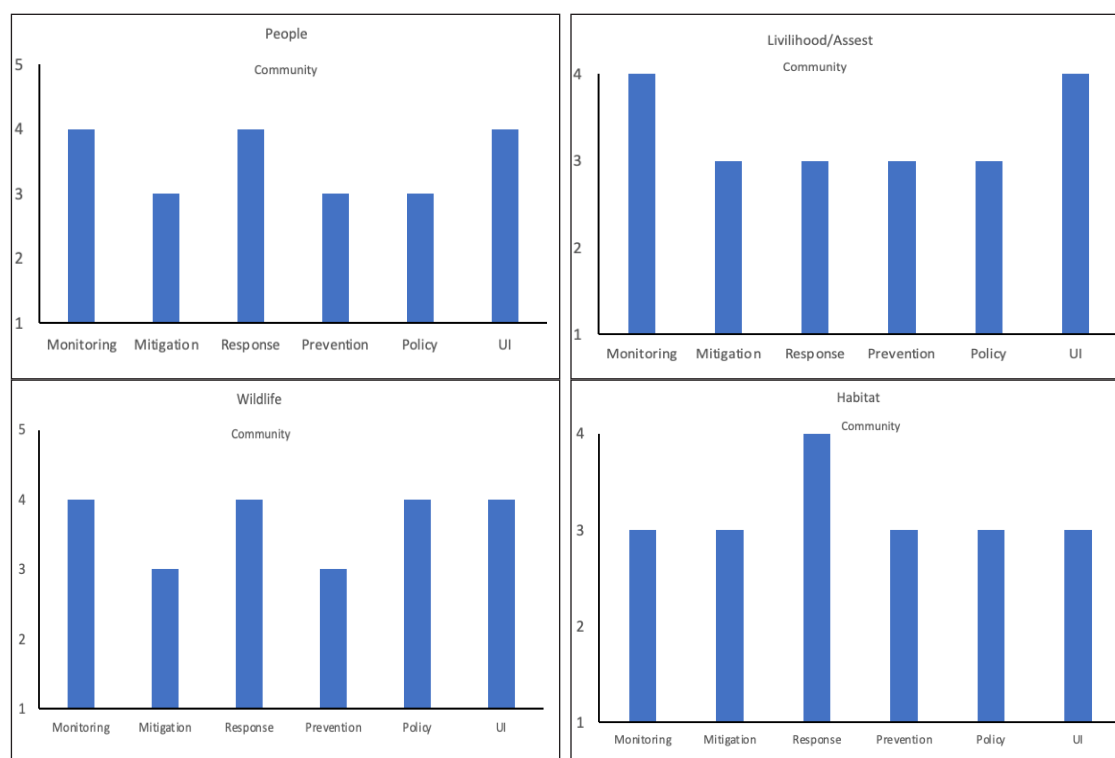


Figure 9: Graphical representation of Result by Elements for Lhamoiliumchiwog

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 Lhamoilium 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, *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.

4.3.3. Norjansa Chiwog

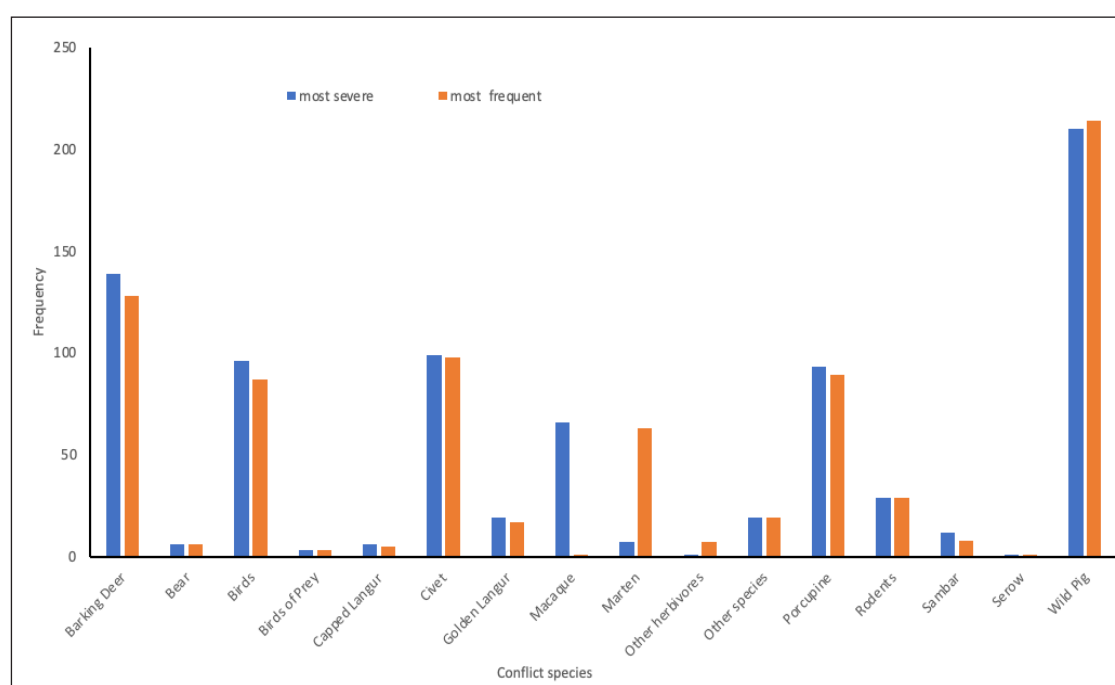


Figure 10: Graphical presentation of Result by Conflict Species for Norjansa chiwog

The frequency distribution of conflict species within Norjansa chiwog indicates that wild pigs is the most significant contributors to human-wildlife conflict, with incident of (n-200) likely due to their tendency for crop depredation and habitat encroachment. Barking Deer, birds, Civet, and Porcupine also show consistently high levels of both severity and frequency, indicating they are major contributors to human-wildlife conflict impacting the livelihood of the communities. Moderate conflict levels are associated with rodents, Macaque and martin, reflecting their substantial impact on agricultural and property

resources. In contrast, species such as bears, capped langur, sambar deer and serow exhibit lower conflict frequencies. These findings emphasize the need for species-specific conflict mitigation strategies, prioritizing high-frequency species to reduce resource losses and foster sustainable human-wildlife coexistence.

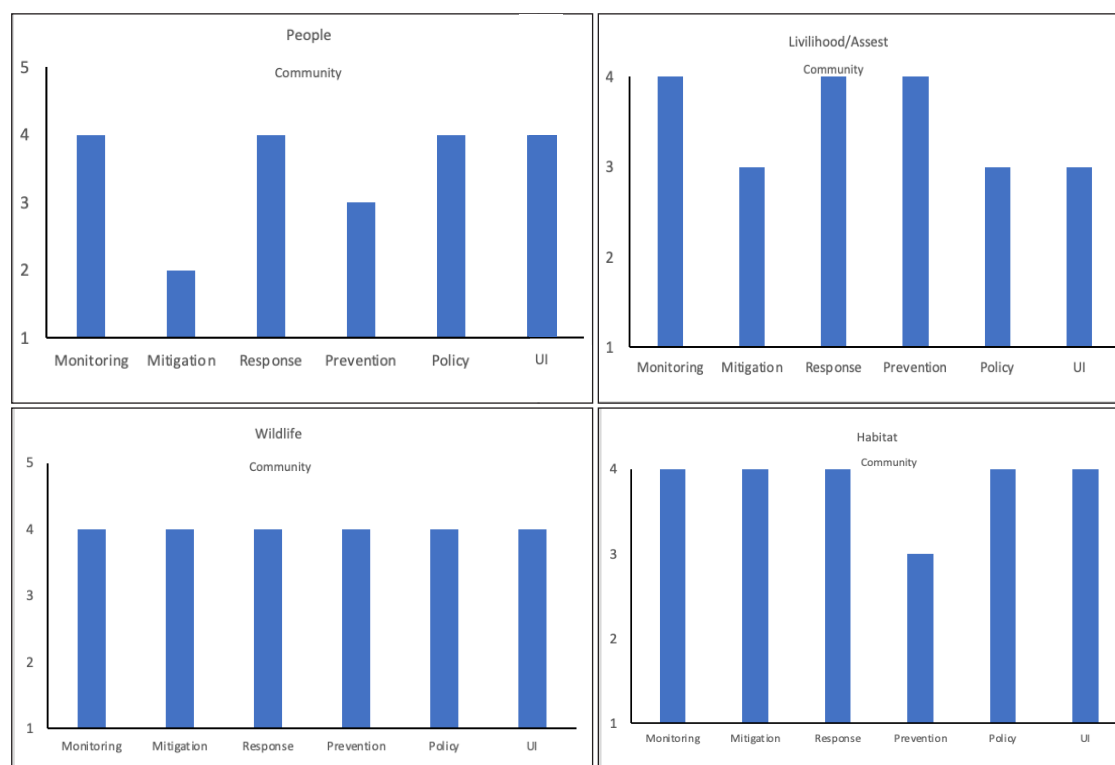


Figure 11: Graphical representation of Result by Elements for Norjansa chiwog

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 Norjansa 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 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.
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.

Community members report higher concerns about people, livelihoods/assets, wildlife, and habitat, suggesting they are most affected by direct conflicts like crop damage and livestock predation. Service providers, with similarly lower scores, seem less directly impacted, focusing more on broader conservation efforts. This highlights the need for Conflict to Co-existence strategies that address local challenges while integrating expertise from service providers for sustainable solutions. Moreover, both service provider and community members of chiwog reported that the livelihood and assets are being affected the most due to human wildlife conflict.

4.3.4. Kherithang Chiwog

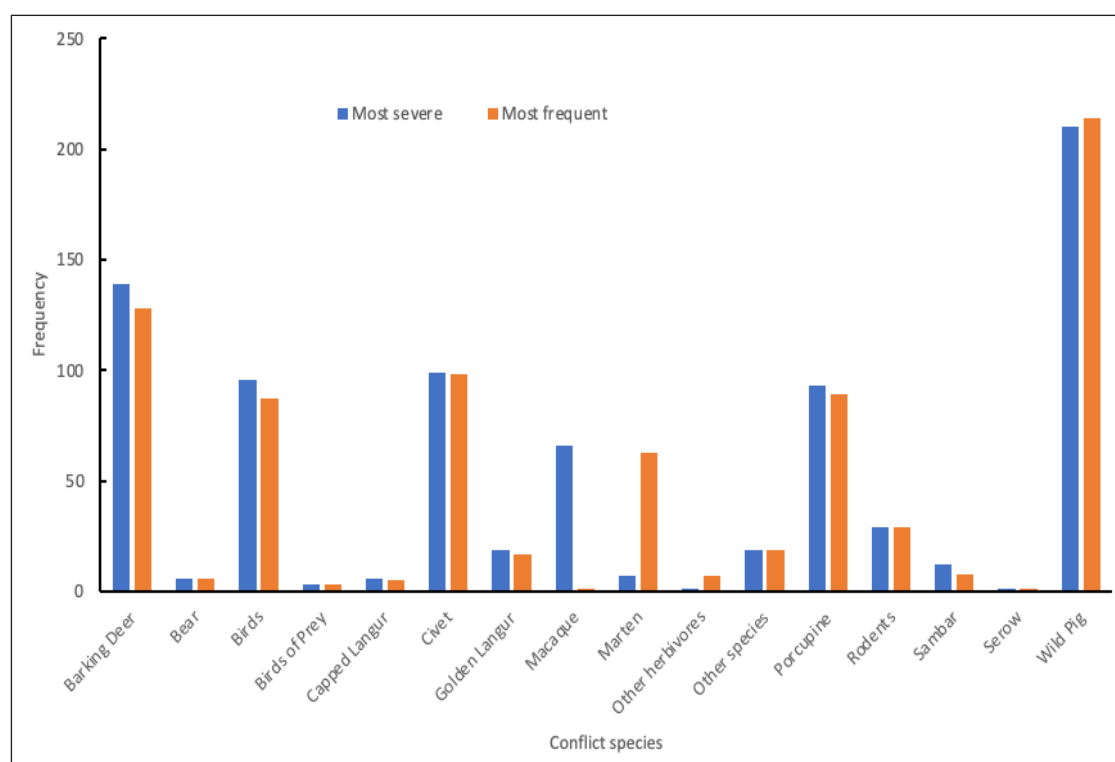


Figure 12: Graphical presentation of Result by Conflict Species of Kherithang chiwog)

The frequency distribution of conflict species within Kherithang chiwog indicates that wild pigs are the most significant contributors to human-wildlife conflict, with incident of (n=200) likely due to their tendency for crop depredation and habitat encroachment. **Barking Deer**, birds, **Civet**, and **Porcupine** also show consistently high levels of both severity and frequency, indicating they are major contributors to human-wildlife conflict impacting the livelihood of the communities. Moderate conflict levels are associated with

rodents, and martin, reflecting their substantial impact on agricultural and property resources. In contrast, species such as bears, capped langur, sambar deer and serow exhibit lower conflict frequencies. These findings emphasize the need for species-specific conflict mitigation strategies, prioritizing high-frequency species to reduce resource losses and foster sustainable human-wildlife coexistence.

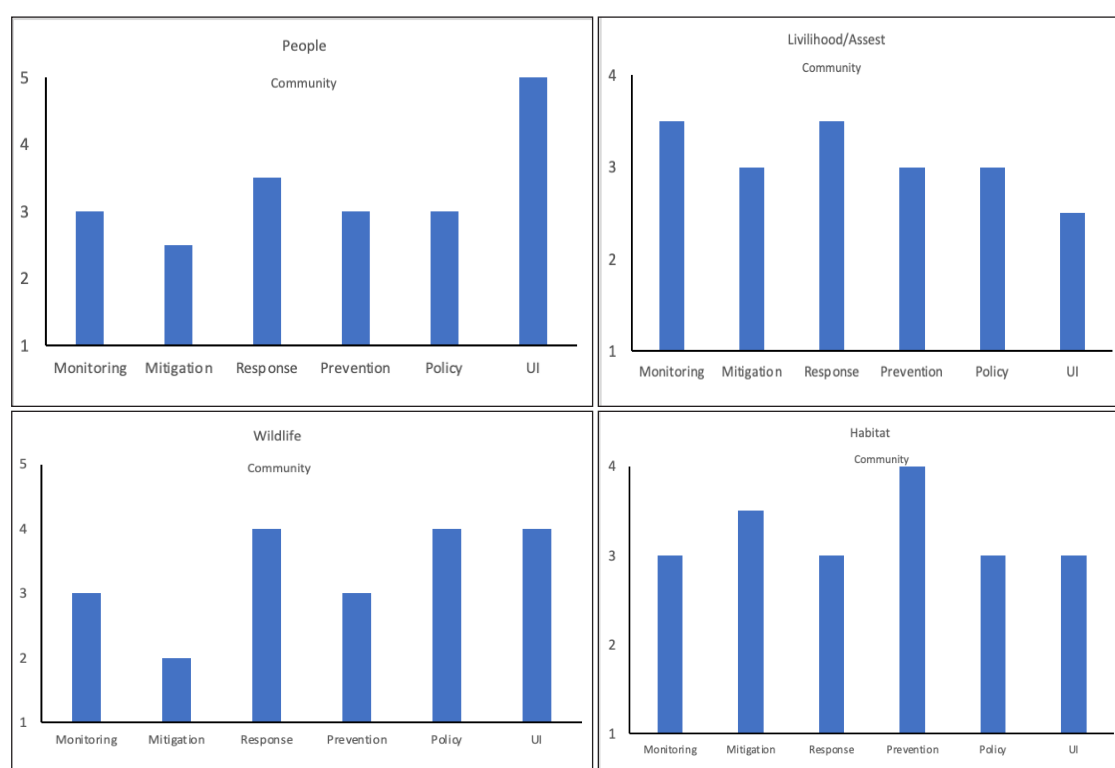


Figure 13: Graphical presentation of Result by Elements for Kherithang chiwog

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 Kherithang 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, *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 *Monitoring* highlighting the lack of monitoring systems which leads to habitat degradation and increased vulnerability to human activities.

Policy and **prevention** measures show potential but require better implementation to address community and wildlife needs effectively. A collaborative approach, incorporating community inputs and service provider expertise, is essential to improve HWC management comprehensively.

4.3.5. Dangreybu Toed Chiwog

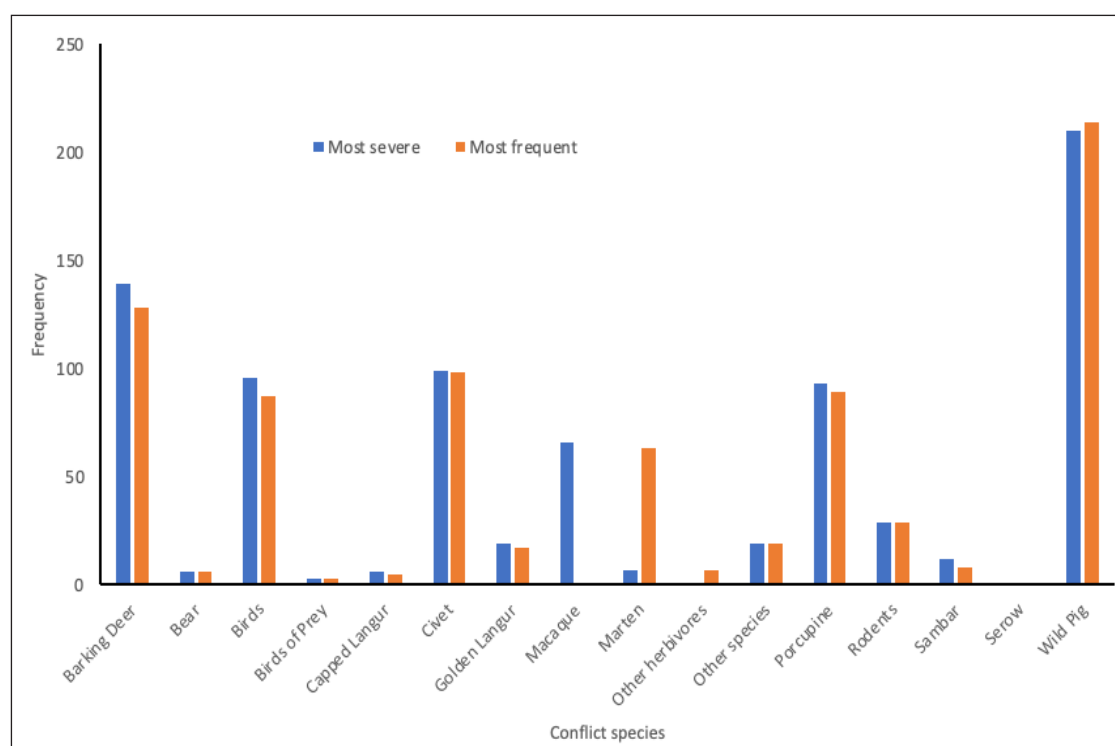


Figure 14: Graphical presentation of Result by Outcome for Dangreybu Toed chiwog

Respondents identified wild pigs as the principal species causing human-wildlife conflicts, recording the highest number of both severe (n=210) and frequent (N=214) conflict incidents. Barking deer, porcupine, civet and birds also ranked high, with macaques reported by around 139 respondents for both frequency and severity. Birds were noted predominantly for severe impacts by roughly 96 respondents. Macaque and Marten were moderately reported, with Rodent showing a slightly higher frequency than severity, while golden langurs were rarely mentioned, indicating limited conflict presence.

The differences between respondent groups highlight the importance of improved communication and data sharing to ensure comprehensive monitoring of both the frequency and severity of wildlife conflicts, thereby enhancing targeted mitigation strategies.

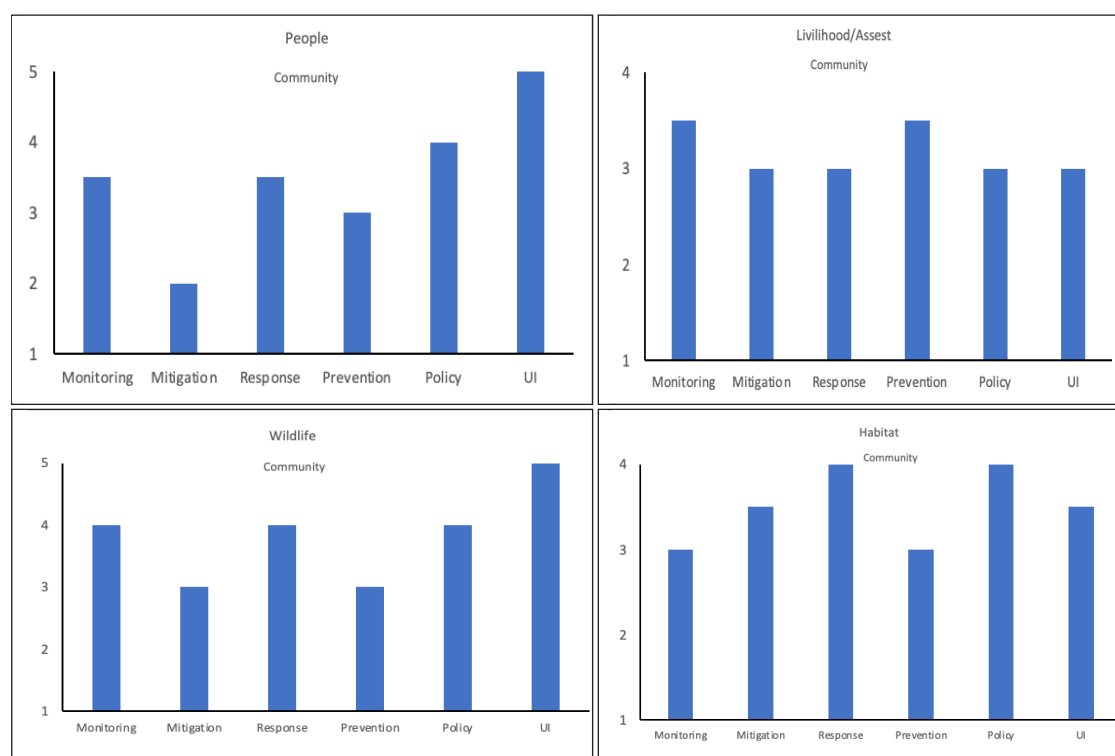


Figure 15: Graphical presentation of Result by Elements for Dangreybu Toed chiwog

All six contributing elements to livelihood security performed weakly, with "Mitigation" and prevention scoring especially low. This calls for targeted interventions that enhance mitigation strategies and preventative measures (e.g., fencing, deterrents), strengthen awareness, and improve policy responsiveness to ensure that livelihoods can coexist sustainably with wildlife presence. Insufficient monitoring limits the ability to anticipate and respond effectively to conflicts, while inadequate mitigation exacerbates socioeconomic vulnerabilities, threatens wildlife populations, and degrades habitats. Enhancing monitoring systems and developing robust mitigation strategies are essential to reducing conflict intensity, safeguarding livelihoods, preserving biodiversity, and fostering sustainable human-wildlife coexistence. The habitat outcomes were assessed more positively, indicating that ecological systems remain intact, and conservation policies may be succeeding in preserving non-human components of the landscape.

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 191 participants (42 males and 149 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 Dunglagang gewog is projected at Nu.2.45 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)	All five chiwogs	Short term	DFO	Community	0.300	Potential donors	2026
	1.2 Provide equipment for QRT members (raincoats, gum boots, quality torches)	All chiwogs	Short term	DFO	community	0.500	Potential donors	2027
	1.3 Provide Alternative crops (cardamom, ginger, Lemon, avocado)	Norjansa	Long term	Agri/ DFO	Community	0.500	Potential donors	2027 - 2029
	1.4 Supply materials for net fencing (green net, 150 sets)	All chiwogs	Short term	Agri/ DFO	Community	0.100	RGoB	2026 & 2029
Habitat	2.1 Establish enrichment plantations and seedling supply for CFs.	All chiwogs	Long term	DFO	Community	0.300	Potential donors	2026 - 2030
People	3.1 Conduct awareness programs on HWC	All chiwogs	Short term	DFO	LG	0.275	Potential donors	2026 - 2030
Wildlife	4.1 Enhance SMART Patrolling	All five Chiwogs of Dunglagang	Short term	DFO	Community	0.500	RGoB	2026 - 2030
Total						2.45 m		

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 evaluators, including representatives from functional divisions, 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)	5 nos QRT group formed	0	nos	5				
		1.2 Equipment for QRT members (raincoats, gum boots, quality torches)	No. of QRT equipment procured and provided to the QRT members	200	No		35	0		
		1.3 Provide Alternative crops (cardamom, ginger, Lemon, avocado)	No. of seedlings provided		No		500	500	500	
		1.4 Supply materials for net fencing (green net, 150 sets	No of sets supplied		No	30			30	
Habitat	Ensured sufficient habitat for wildlife	2.1 Establish enrichment plantations (fruit trees) in SRF land and seedling supply for CFs.	Area of SRFL where plantation of fruit trees is established		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		No	10	10	10	10	10

7. Conclusion

Key findings from the 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 Dunglagang 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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