

SAFE System Strategy for Human Elephant Conflict Management in 3 Pilot Project Areas (Gelephu, Samtenling and Shompangkha), Sarpang Dzongkhag



Divisional Forest Office, Sarpang
Department of Forests and Park Services
Ministry of Agriculture and Forests
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Wednesday, August 31, 2022

PREFACE

His Majesty the Fourth King Jigme Singye Wangchuck advocated conservation statement: “Throughout the centuries the Bhutanese have treasured their natural environment and have looked upon it as the source of all life. This traditional reverence for nature has delivered us into the twentieth century with our environment richly intact. We wish to continue living in harmony with nature and to pass on this rich heritage to our future generations”. With this philosophy, Bhutan follows middle path approach to development, supporting the integration of conservation and sustainable development. The harmonious co-existence between people and nature continued with the Royal Government’s developmental philosophy of Gross National Happiness. As a result, the Bhutanese have developed intimate relationship with nature.

Bhutan’s conservation success has been recognised globally receiving the United Nations Champions of the Earth Award and WWF’s Paul Getty Award. But the success was followed by an inevitably conflicts between people and wildlife. The damages of crop and property caused by wildlife needs to be addressed by developing measures to mitigate losses incurred by farmers. If the issues are left unattended, it could endanger conservation prospects in the future.

SAFE System Strategy for Human Elephant Conflict Management in 3 Pilot Project Areas (Gelephu, Samtenling and Shompangkha), Sarpang Dzongkhag has been prepared involving all relevant stakeholders and partners in a participatory manner by Divisional Forest Office, Sarpang funded by WWF Bhutan. Addressing HEC is a top priority for the department and we are committed to implementation of the strategy to help address the needs of both humans and wildlife in order to make the pilot areas a safer place to live. The strategies outlined here are expected to reduce human-elephant conflicts in the pilot areas to enhance the livelihoods of our farmers, and offset their losses from elephant damages.

I wish to congratulate DFO, Sarpang for bringing out this important SAFE system strategy to address human-elephant conflict. It is my hope that the strategy would be successfully implemented within the planned period and bring about positive changes in the livelihoods of our farmers and reduce their losses from elephant damages. My best wishes for the successful implementation.

TAKSINI DELEK!

Lobzang Dorji
DIRECTOR.

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Our sincere appreciation and gratitude go to all officials working in Gelephu, Samtenling and Shompangkha Gewogs and the people of Gewogs for rendering assistance during the survey and field work.

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Table of Contents

PREFACE	ii
ACKNOWLEDGEMENT	iii
List of acronyms	v
1. Introduction to HWC in the project area.....	1
2. Objective of the rapid assessment (RA) of HEC	2
3. Methodology	3
4.1 Outcomes	4
4.2 Effectiveness	4
4.3 Elements.....	7
4.2 HEC current context in project area.....	8
4.2.1 Gelephu Gewog	8
4.2.3 Shompangkha Gewog	14
5. The SAFE System Strategy	17
6. Monitoring and Evaluation	22
7. Way Forward	26
8. References.....	27
10. Annexure.....	29
10.1 List of participants for the workshop	29
10.2 HEC Rapid Assessment Questions and Criteria	30

List of acronyms

BC3	Biological Corridor number 3
CFO	Chief Forestry Officer
DFO	Divisional Forest Office
DFOS	Divisional Forest Office, Sarpang
DoFPS	Department of Forests and Park Services
EF	Electric Fence
HEC	Human Elephant Conflict
HWC	Human Wildlife Conflict
JSWNP	Jigme Singye Wangchuck National Park
masl	Meter above sea level
PWS	Phibsoo Wildlife Sanctuary
QRT	Quick Response Team
RA	Rapid Assessment
RMNP	Royal Manas National Park

1. Introduction to HWC in the project area

Human Wildlife Conflict (HWC) continues to be one of the conflicts prevalent all over the country and it has become one of the issues of national importance. Every year farmers are losing their crops and livestock to wildlife. The farmers have lost significant amount of crops to wild animals besides putting strong efforts to grow crops in their agricultural land. HWC is one of the biggest challenges affecting conservation and farmer with substantial socio-economic costs in the country. It is also a constraint to the country's agricultural sustainability and food security in a country where agriculture serve as the backbone of the economy. The wildlife such as elephants, wild boar, bear, leopards, wild dogs, tiger, monkey and deer are major conflict species.

Although HWC is prevalent all over the country, the southern region suffers heavily from crop and property damages by elephant. The damages caused by elephants have contributed to economic loss on farmers in Southern Bhutan. Among the Southern Dzongkhags affected by the Human Elephant Conflict (HEC), Sarpang is the most affected dzongkhag in the region. Divisional Forest Office (DFO), Sarpang (2017) reported 263 events from twelve of fourteen Gewogs from the period 2016-2017.

DFO Sarpang is located between 26°44'N to 26°50'N and 89°51' E to 90°19'E. It was established in 1959. The elevation of the area ranges from 63-3506 masl. It adjoins with 3 protected areas. In the north lies Jigme Singye Wangchuck National Park (JSWNP), in the east lies Royal Manas National Park (RMNP), in the south-west lies Phibsoo Wildlife Sanctuary (PWS) and in the south it joins with a large track of reserve forest of Indian State of Assam and West Bengal. The Biological Corridor 3 (BC3) falls within the jurisdiction of DFO which connects the above mentioned 3 protected areas.

The diversity of the flora and fauna is due to its climatic and topographic variations. As per DFO (2018) there are 192 tree species, 27 fish species, 17 bamboo species, 66 orchid species, 43 mammal species, 220 bird species, 14 reptile species, 56 butterfly species, 10 amphibian species, 12 dragonfly and damselfly species, 10 lady beetle species and 11 molluscs species. As per the record of the Department of Forests and Park Services (DoFPS) the large herbivores found are

Asiatic elephant, Gaur, Sambar deer, Chital, buffalo, barking deer, wild boar among the carnivores leopard, wild dog, etc. The result of camera trap in 2020 recorded 4 tigers.

The home ranges of elephants that visit Sarpang also include areas that fall within the Indian states of Assam and West Bengal. However, elephants take refuge in these protected areas and in the reserve forests of international borders and migrate to cropland during the peak cropping seasons.

The crop destruction by wild pigs is rampant in the villages besides reports of destruction by deer, rabbits and birds. Crops such as maize, paddy, banana, arecanut and vegetables are vulnerable crops predated by wild pigs, elephants, deer, monkey, rabbits and birds. Farmers use scarecrow, traditional fencing, electric fencing, make noise by beating drums and light fire to guard their crops. Livestock is the second important source of income and food for farmers. Majority of the farmer rear livestock for self-consumption of livestock products, income, manure and drought power. The problem and constraints associated with livestock rearing are insufficient fodder, grazing land, poor quality of breed and labour shortage.

As the HEC causes disharmony between people and wildlife, the DFO has taken up interventions such as livestock and crop insurance scheme, installation of electric fencing, enrichment of wildlife habitat and quick response team (QRT) established to mitigate crop destruction by wildlife. But these interventions were not able to address the problem to larger an extent; HEC continues to prevail despite prevention and mitigation efforts by DFO, Sarpang. The greatest challenge of the DFO today is to balance between elephant conservation and safeguarding lives and livelihood of local communities. However, the DFO is looking forward to addressing HEC to a larger extent with development and implementation of this SAFE strategy to HEC in three pilot project Gewog of Sarpang Dzongkhag namely Gelephu, Samtenling and Shompangkha Gewogs.

2. Objective of the rapid assessment (RA) of HEC

- i. To determine how safe the three Gewogs are from conflicts.
- ii. To determine the unsafe part of the three Gewogs from conflicts.
- iii. To determine how to make the three Gewogs safer from conflicts.

- iv. To develop strategy for the implementation of Safe system approach to HEC in project areas

3. Methodology

The SAFE System Approach to HWC is results-focused and delivered through five Strategic Outcomes: safe person, safe assets, safe wildlife, safe habitat, and effective monitoring (Brooks, 2015). Six conflict management elements are policy, prevention, mitigation, understanding the conflict, response, and monitoring. An integrated management approach to HEC means that all six elements must be accounted for in HEC project sites, and none should be implemented in isolation.

The RA for HEC was carried out through multi-stakeholder workshop in all three Gewogs (Gelephu, Samtenling and Shompangkha) following SAFE System Approach.

Before RA workshop was conducted, HEC hotspot map was produced to document basic Gewog profile and get an overview of the HEC scenario in the Gewog. All relevant stakeholders representing Renewable Natural Resources (RNR) and local government officials participated in the workshop. There were 33 participants in total. The participants were introduced to the HEC Safe System Approach followed by systematic assessment tool of HEC.

The assessment was carried out by using score-sheet on the scale of 1-4 based on criteria followed by HWC SAFE System Strategy development. It determined minimum criteria for HEC interventions which enable to capture SAFE baseline for HEC in each Gewog and the gaps in HEC interventions across the conflict area. Based on the results of the SAFE rapid assessment of HEC, SAFE strategies and interventions were developed for each Gewog to make people, their assets, wildlife and habitat safer. The SAFE strategy was presented in the presence of DFO, Sarpang staff, Gewog RNR staff, Gewog Administration Officials and communities to finalize the proposed strategies.

4. Overall Current Context: HEC in project areas

4.1 Outcomes

As per the overall SAFE Baseline results for the project area (Gelephu, Samtenling and Shompangkha Gewogs) showed that wildlife and people are safer than habitat and asset. The wildlife habitat in Gelephu scored low compared to the other 2 Gewogs because the Gewog increasingly lost habitat due to land use change from natural forest to construction area (houses and roads for increasing human population) being a municipal area. The life of people in Gelephu was found not safe because incidents of human injury and damage to property by wildlife increased over time. In Samtenling Gewog wildlife and their habitat were found safe due to the presence of natural habitat and a community managed forest in place. The people in the Gewog also carried out patrolling to curb illegal activities besides forestry personnel. The assets of people in Shompangkha Gewog were found to be very unsafe because of dysfunctional electric fencing unable to prevent wildlife entering their land and protect it from destruction. Monitoring was found the weakest across all Gewogs as shown in Table 1. The reason that led to score 0% was in all Gewogs mapping HEC hotspot and monitoring impact and severity of HEC was not carried out to study and mitigate.

Table 1: Safe Baseline figures for each Gewog across the outcomes with mean and standard

	Gelephu	Samtenling	Shompangkha	Mean	Stdev.
Safe Person	59%	74%	74%	69%	9%
Safe Asset	67%	67%	42%	59%	14%
Safe Wildlife	60%	80%	60%	67%	12%
Safe Habitat	36%	64%	55%	52%	14%
Monitoring	0%	0%	0%	0%	0%

4.2 Effectiveness

A deeper understanding of the current strengths and weaknesses in terms of HEC Management across the three Gewogs can be determined from the HEC RA results. The green bars in Figure 1 shows the criteria met and the red bars show criteria not met against each of the SAFE Outcomes. The low SAFE Baseline for all the components is contributed by the red bars against each criterion of the components. Therefore, focus has to be more on red bar to carry out mitigation activities to improve management and reduction of conflict.

The criteria met across each of the SAFE Outcome in the Figure 1 are through existing government programs across the Gewogs. The government should continue with the same current actions across these criteria.



Figure 1: Frequency of number of times criteria are met (green) and not met (red)

4.3 Elements

The integrated nature of the HEC management currently in place across the three Gewogs is indicated by the HEC RA results. The determination of the current actions against the six elements of conflict is shown in the Figure 2. An even spread of interventions across all the six elements minimize HEC, but the average results across the three Gewogs have significant gaps. It should be our aspiration to score as high as 100% against each of the six elements.

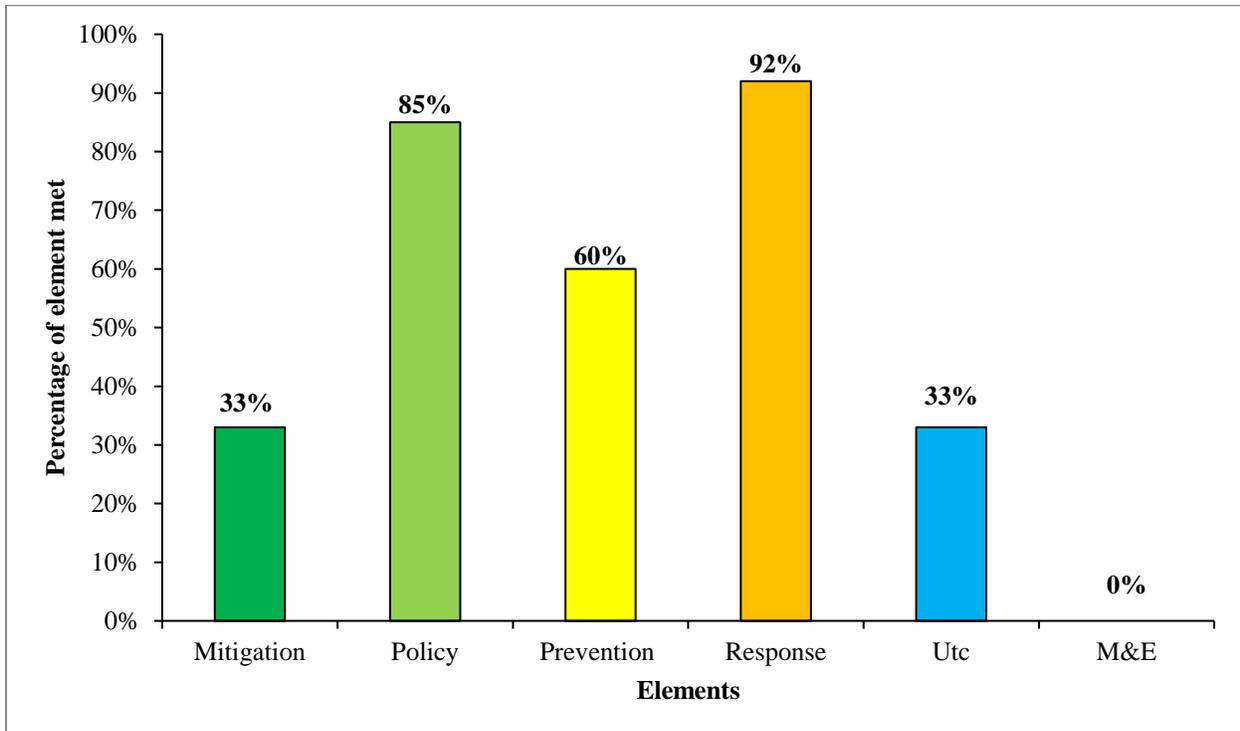


Figure 2: SAFE baseline figures for each conflict element

The support from local based QRT and their participation in conflict reporting mechanism is reflected by the highest score secured by Response (92%). The contribution to this high score is also because of the QRT of DFO, Sarpang attending every HEC case in the areas. Policy has scored 85% because of strong policy foundation in Bhutan securing wildlife and its habitat through adherence to HEC management system. The low result for Prevention (60%) is owing to less effective preventative measures leading to crop loss and livestock depredation. Mitigation (33%) indicates the lack of participation in a locally applicable insurance or compensation, lack of income diversification activities and alternative livelihood programs. Understanding the Conflict (33%) is due to the lack of research to better understand the relationship and behaviours

of elephant contributing to better knowledge on hotspot prediction to allocate preventative measures and to understand why certain trends and behaviours are emerging or declining. Monitoring and Evaluation scored the lowest (0%) because across the three Gewogs the activities that would contribute to scoring against the element were not carried out such as: assessment of financial cost of HEC, tracking community attitudes and tolerance to elephant and monitoring and evaluation of programs achievement by decision makers.

Table 2: SAFE baseline figures for each Gewog across the elements with mean and standard

Conflict element	Gelephu	Samtenling	Shompangkha	Mean	Stdev
Mitigation	0%	60%	40%	33%	30%
Policy	82%	91%	82%	85%	5%
Prevention	53%	71%	57%	60%	9%
Response	88%	88%	100%	92%	7%
Utc	50%	0%	50%	33%	29%
M&E	0%	0%	0%	0%	0%

Table 2 shows the scores of each conflict element in the three Gewogs. The results will act as a baseline to build Strategy over time. Planning activities for Strategy development will need evenly spread actions and mutually applied across the six elements to uplift the score or reduce HEC.

4.2 HEC current context in project area

4.2.1 Gelephu Gewog

Gelephu Gewog has an area of 54 km². The Gewog falls under Sarpang District bordering Assam, India in the south. It has 5 Chiwogs with a total of 467 households and the population of 4461 (male = 2171 and female = 2290). The primary source of livelihood in the Gewog is agriculture and livestock. There are 1101.54 acres of dry land and 463.92 acres of wetland cultivated by farmers. The main crops cultivated are maize and paddy. The gewog has produced 2,220,000 kg of improved paddy, 350,000 kg of local paddy, 230,000 kg of maize, 430 kg quinoa, 110,638 kg vegetables, 10,000 kg of potato, 4,500 kg of pulses and lentils and 1,500 kg of oil seeds in 2019. The main cash crop produced in 2019 was 250,000 kg of areca nut, 150,000 kg of ginger, 149,000 kg of orange and 343,800 kg of fruits and nuts.

There are cattle (n = 1542), goat (n = 220), poultry (n = 10885), pig (n = 301), sheep (n = 41), bees (n = 128) and fish (n = 5,300). The livestock in the Gewog produced 52,754 kg cheese, 5,366 kg of butter, 23,560 kg of pork, 3,114 kg of chevon, 16,282 kg of chicken, 103 liters of honey and 2,500 kg of fish in 2019.

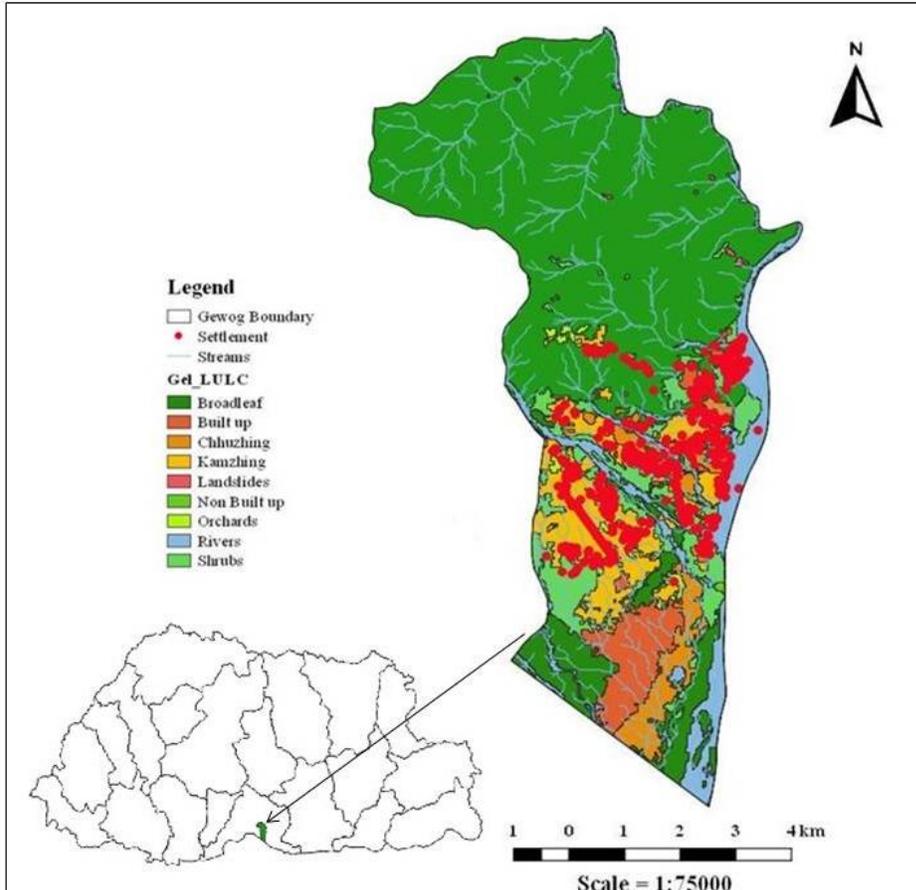


Figure 3: Gelephu Gewog land use map

HEC is a threat to 83% (DFO, 2020) of the farmers in the Gewog. Despite guarding their crops using the combination of traditional and modern methods, they lose crops to wildlife. They use traditional fencing, scare crows, trenches, clearing bushes and electric fencing to deter wildlife from attacking crops. There are about 17.81 km of electric fencing installed at ten different locations in group or individually, out of which only 3 km of the electric fence is functional.

Crop damage by wildlife and security reasons has led some farmers to stop cultivating crops in the Gewog. Some of the alternative income sources are daily wage labour, driving taxi,

community contract work and some also own small shops. Elephants and wild pigs are the most conflicting animals in the gewog. On an average a household in the Gewog has lost Nu.13369.49 worth of crop to wildlife. 86% of crop damage caused by wildlife occurs during the night (DFO, 2020).

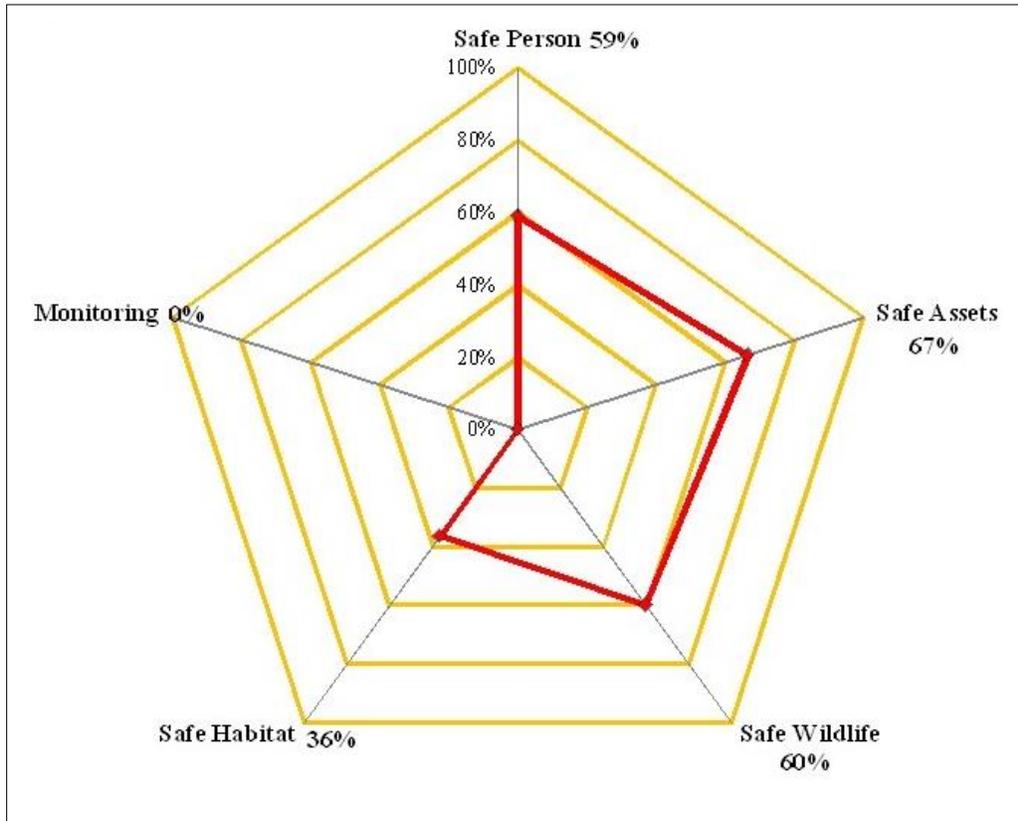


Figure 4: SAFE baseline for Gelephu gewog

The result of the HEC RA shown in Figure 4 indicates that asset (67%) and wildlife (60%) are marginally safer than people (59%). Habitat of wildlife was measured to be less safe in the Gewog because the habitat of wildlife loss has increased over time, no spatial plan exists, and perforation in natural forest increased over time, natural habitat decreased overtime and patrolling are carried out less frequently by forestry personnel as well as local people. The weakest part of the system is the Monitoring (0%). This is because the Gewog lacks hotspot mapping of HEC, monitoring impact and severity, tracking community attitude and measurement of its performance.

The integration of activities to HEC management is very weak; therefore, the score against the element in the Gewog is poor. Mitigation (0%), Monitoring and Evaluation (0%), Understanding of Conflict (50%) and Prevention (53%). It is the strong policy of the government that led to score 82% and the action taken by the forestry personnel and local people to respond during HEC incidences that led to 88% score respectively.

Therefore, it is recommended to carry out research in the Gewog to understand more on the spatial, temporal and social characteristics of conflicts to manage and minimize crop losses.

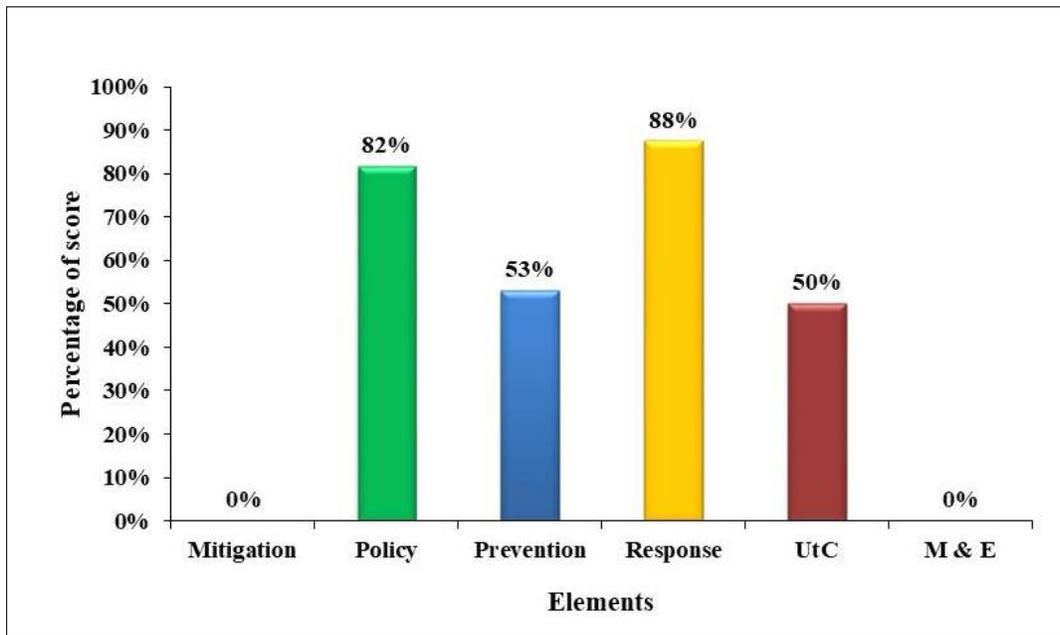


Figure 5: HEC element baseline for Gelephu Gewog

The dearth of mitigation activities in the Gewog genuinely indicates the need for mitigation activities to reduce negative local sentiments around conflict. Community perceptions of conflict and fear can build up to become disproportionate with the actual conflict and could lead to active removal or killing of wildlife before an incident takes place. Prevention activities such as locally applicable barriers, electric fencing, crop protection during peak HEC times and not disturbing forest connectivity to wildlife habitat must be carried out to reduce crop raiding by wildlife. It is also crucial for the project implementers and decision makers to monitor and evaluate achievement of their program. The implementation of the recommended activities will contribute towards increasing the number of criteria being met for Understanding the Conflict, Prevention, Monitoring and Evaluation and Mitigation across all elements of conflict.

4.2.2 Samtenling Gewog

Samtenling Gewog has an area of 55.4 km². The Gewog falls under Sarpang District bordering Assam, India in the south. It has 402 households and the population of 2974 (male = 1497 and female = 1477). The primary source of livelihood in the Gewog is agriculture and livestock. There are 1551 acres of dry land and 313.3 acres of wetland cultivated by farmers. The main crops cultivated are maize, paddy and millet. The gewog has produced 300,000 kg of improved paddy, 100,000 kg of local paddy, 300,000 kg of maize and 23,000 kg millet in 2019. The main cash crops produced in 2019 were 370,000 kg of areca nut, 120,000 kg of ginger and 300,000 kg of orange.

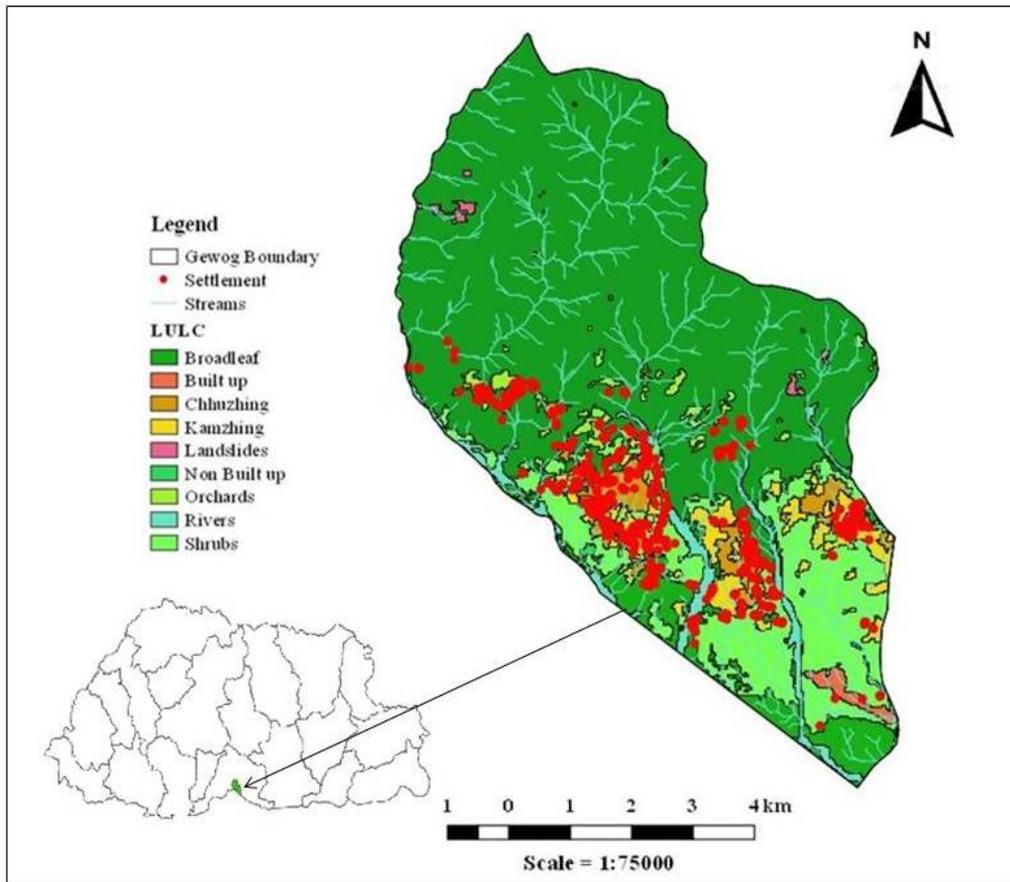


Figure 6: Samtenling Gewog land use map

There are cattle (n = 1355), horse (n = 64), goat (n = 225), poultry (n = 22521), pig (n = 264), sheep (n = 52), bees (n = 291) and fish (n = 16000) in the Gewog. The livestock in the Gewog

produced 214,000 kg of milk, 8,000 kg cheese, 6,800 kg of butter, 59,000 kg of pork, 3,100 kg of chevon, 29,000 kg of chicken, 203 liters of honey and 2,200 kg of fish in 2019.

HEC is one of the major constraints to agriculture development in the Gewog. Elephants and wild pigs are the most conflicting animals in the Gewog. About 82.5% of the people in the Gewog suffer from wildlife crop depredation (DFO, 2020). Most of the crop damages take place during the night (82.9%). On an average a household in the Gewog has lost Nu.11982.64 worth of crop to wildlife. There are about 21.65 km of electric fencing installed at ten different locations in groups or individually out of which only 5.8 km of the electric fence is functional.

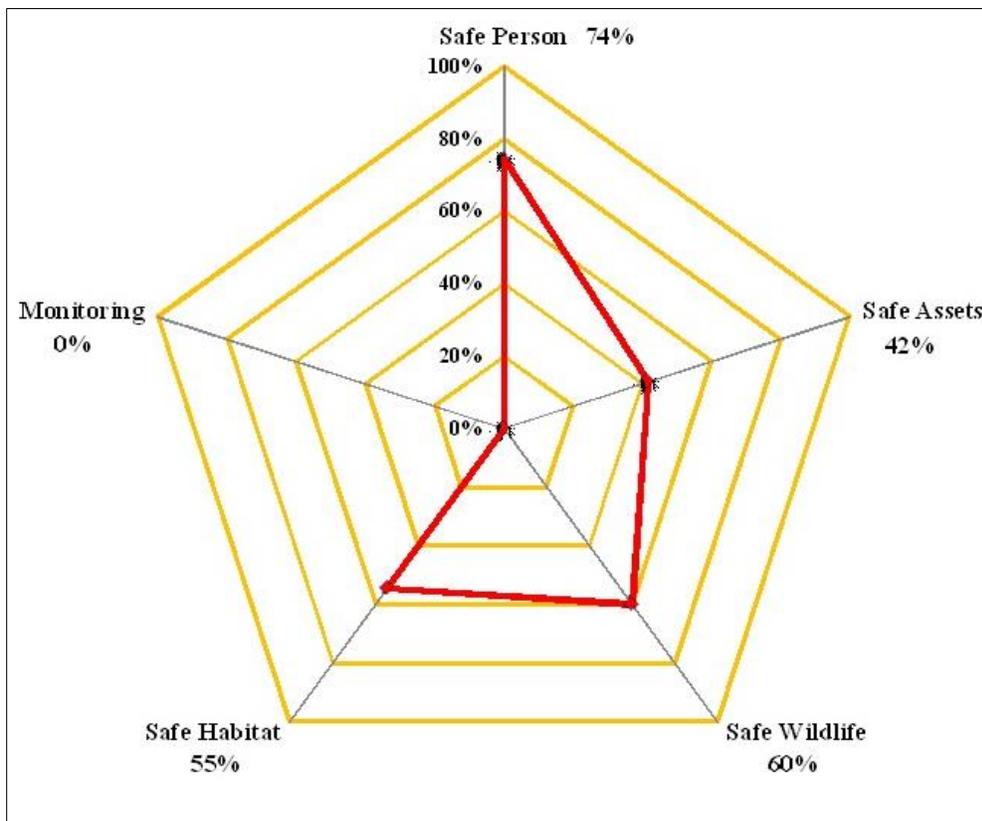


Figure 7: SAFE baseline for Samtenling Gewog

The HEC rapid assessment results show that SAFE baseline for People 74% which is safe and while Wildlife (60%) is marginally safe. The Habitat (55%) and Asset (42%) were measured to be less safe in the Gewog because of the wildlife habitat loss and perforation in natural forest has increased over time. The weakest part of the system is the Monitoring (0%).

The integrated nature of the current HEC management actions across the Gewog is good with multiple criteria being met for the Policy (91%), Response (88%), Prevention (71%) and Mitigation (60%) but there is no mechanism to take up research in the Conflict profile (0%) and Monitoring and Evaluation (0%) as indicated in the Figure 8.

There is need to carry out study in the Gewog to understand more on conflicts profile to better understand where to allocate preventative measures and why some trends and behaviours are emerging or declining. It is also crucial for the project implementers and decision makers to map HEC hotspot, to know attitude of people, peoples' tolerance to HEC and monitor and evaluate the impact of HEC management interventions.

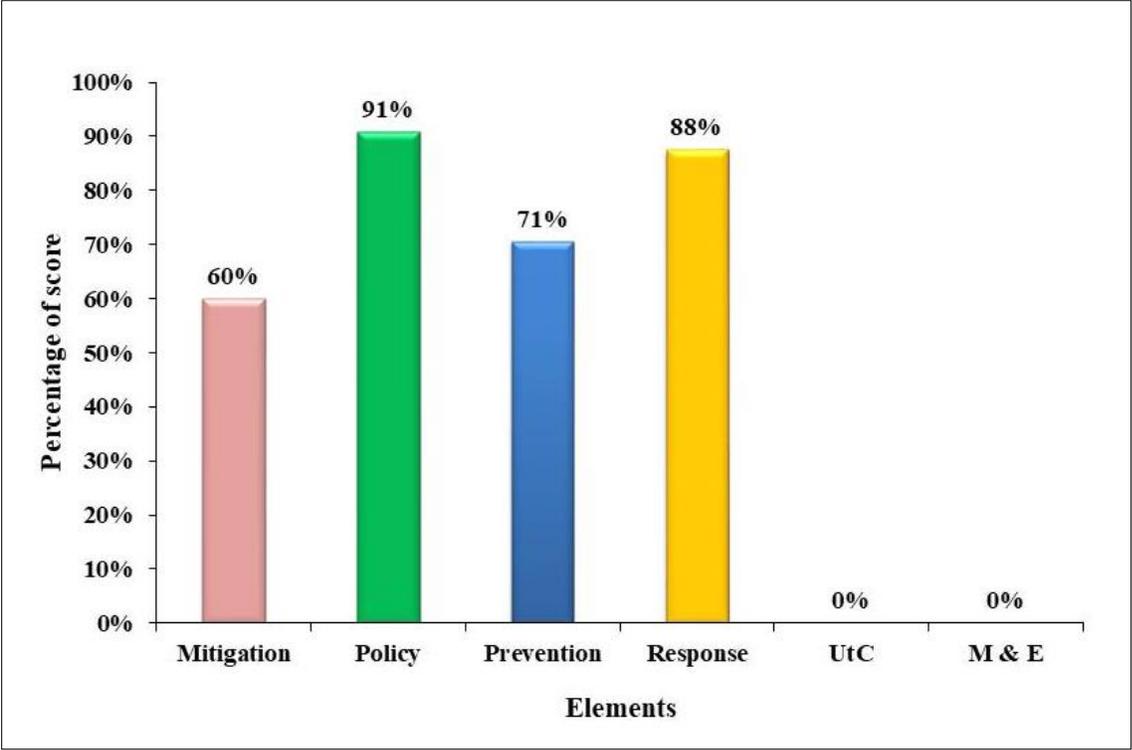


Figure 8: HEC element baseline for Samtenling Gewog

4.2.3 Shompangkha Gewog

Shompangkha Gewog has an area of 21 km². The Gewog falls under Sarpang District bordering Assam, India in the south. It has 404 households and the population of 2877 (male = 1398 and female = 1479). The primary source of livelihood in the Gewog is agriculture and livestock. There are 752.32 acres of dry land and 251.61 acres of wetland cultivated by farmers. The main

crops cultivated are maize and paddy. The gewog has produced 325,850 kg of improved paddy, 333,010 kg of maize, 20,930 kg millet, mustard 5,000 kg and quinoa 250,000 kg in 2019. The main cash crops produced in 2019 were 560,000 kg of areca nut, 114,680 kg of ginger and 1,079,980 kg of orange.

There are cattle (n = 1761), goat (n = 394), local poultry (684) and improved poultry (n = 56805) in the Gewog. The livestock in the Gewog produced 435,117 kg of milk, 6,368 kg cheese, 4,923 kg of butter, 48,683 kg of pork, 2,628 kg of chevon, 72,804 kg of chicken and 6,417,826 numbers of eggs in 2019.

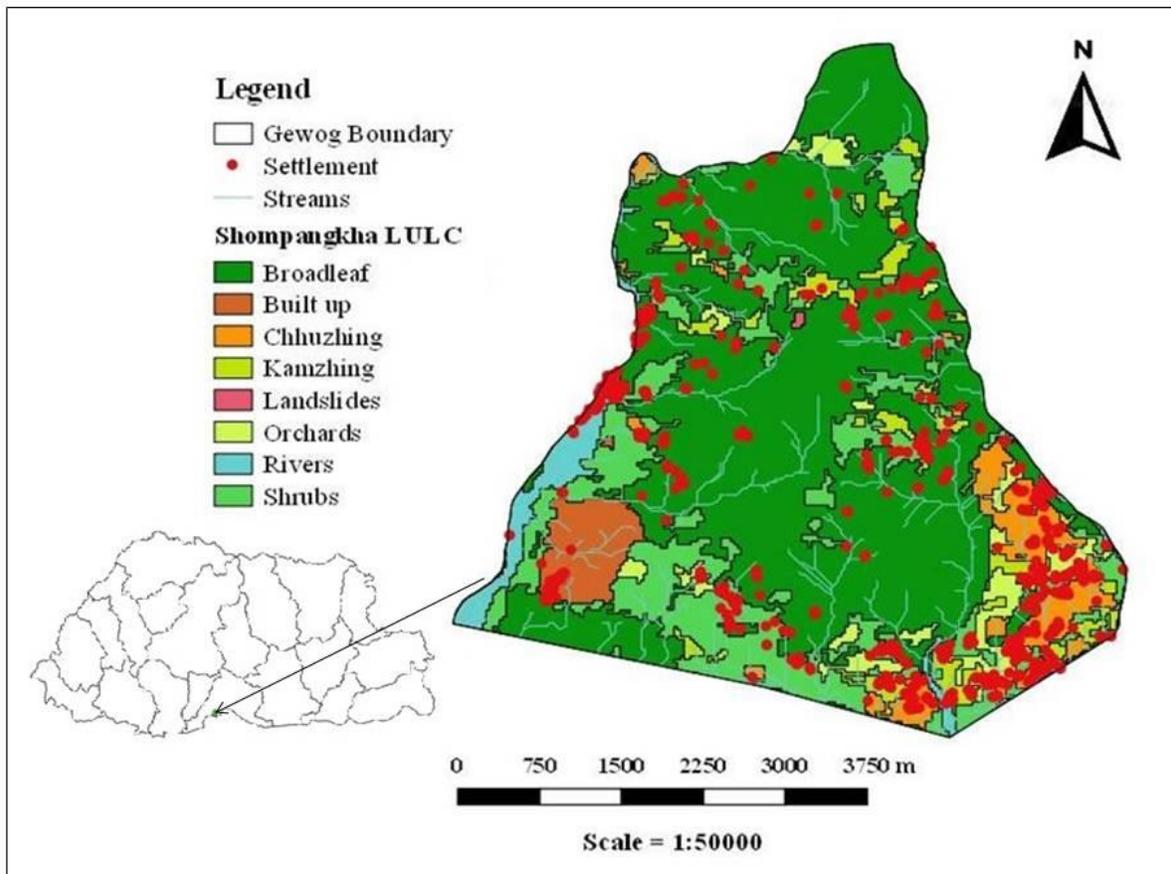


Figure 9: Land use map of Shompangkha Gewog

The people of Patabari, Geshinggaon, Norbugang and some parts of Kencholing area affected by the HEC. Elephants and wild pigs are the most conflicting animals in the gewog. In 2020 about 62% of the people were affected by the wildlife conflict, a household in the Gewog has lost Nu.18,523.46 worth of crops to wildlife. Crop damages are mostly done at night by the wildlife;

hence they guard their crops, use traditional fencing, scare crow, make trench, clear bushes around the field and also use electric fence. There are about 14.38 km of electric fencing installed at three different locations in group. The electric fences currently are not functional due to burnt energizer and rusted wires. It is at least 4 years old.

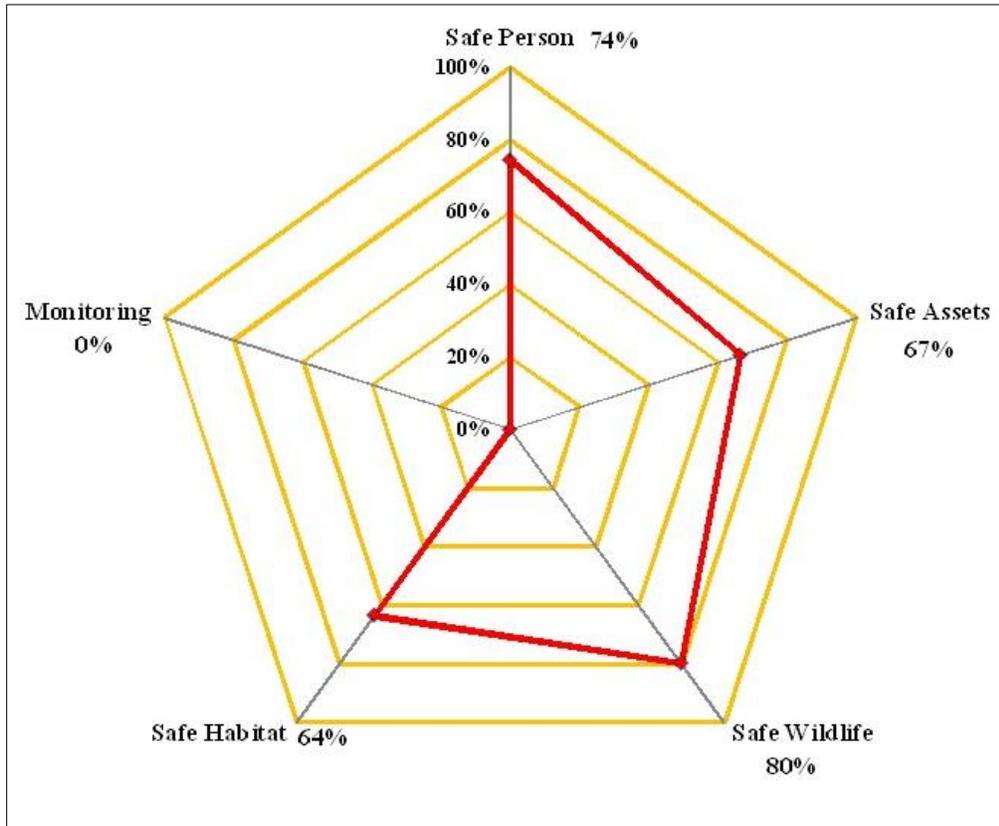


Figure 10: SAFE baseline for Shompangkha Gewog

The HEC RA results show that the People (74%), Wildlife (80%), Asset (67%) and Habitat (64%) are safe. Monitoring (0%) is the weakest part of the system

Figure 11 shows the strategy will need to support HEC actions in Mitigation (40%) to reduce negative local sentiments around conflict. Prevention (57%) activities such as locally applicable barriers, electric fencing, crop protection during peak HEC times and not disturbing forest connectivity to wildlife habitat must be carried out to reduce crop raiding by wildlife. There is need to put some effort to Understand Conflict (50%) and no criteria met under Monitoring and Evaluation (0%). It is crucial for the project implementers and decision makers to monitor and evaluate achievement of their program to keep track of project.

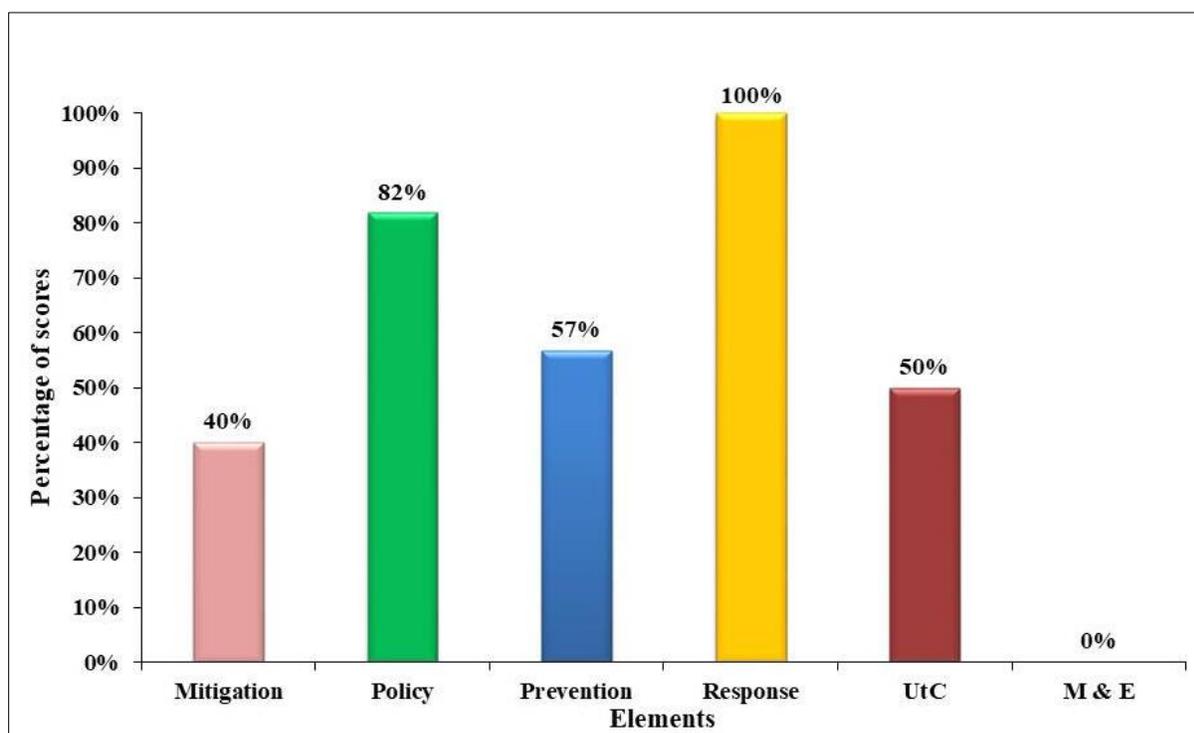


Figure 11: HEC element baseline for Shompangkha Gewog

5. The SAFE System Strategy

The following strategic actions and activities were developed based on the findings from HEC RA in consultation with the relevant stakeholders representing each Gewog to ensure that all the elements of Safe approach are addressed and improved to the optimum extent. The strategic actions in Table 3 are required to be implemented over the time to make HEC SAFE element improve and for more effective management. The budget requirement to implement the strategic activities in each Gewog is mentioned with timeline.

Table 3: Strategic actions and activities to be implemented in each HEC pilot Gewog

Outcome	Strategic actions	Gelephu	Samtenling	Shompangkha	Timeline
Safe person	Education program	700,000	700,000	700,000	2022-2028
	Alternative livelihood programs	1,500,000	1,500,000	1,000,000	2022-2028
	Consultation workshop	1,000,000	1,000,000	1,000,000	2022-2028
	Partners for	1,000,000	1,000,000	1,000,000	2022-2028

	protection				
Safe habitat	Habitat enrichment	2,000,000	1,400,000	1,000,000	2022-2028
	Spatial Plan for the area	250,000	250,000	250,000	2022
	Community forest management	1,000,000	1,500,000	1,500,000	2022-2028
	Law enforcement	250,000	250,000	250,000	2022 & 2025
Safe asset	Physical structures/cementing along EF line	2,500,000	3,000,000	1,500,000	2022-2028
	Invasive species are cleared or managed	1,400,000	1,400,000	700,000	2022-2028
	Wildlife-friendly farming	700,000	700,000	700,000	2022-2028
Safe wildlife	Safe movement corridor	3,000,000	2,000,000	1,000,000	2022-2028
	Rapid response team are equipped and trained	2,400,000	2,400,000	2,400,000	2022-2028
	Study & understand behavior of wildlife (predator prey dynamics) & people's perception towards wildlife.	400,000	400,000	400,000	2022-2028
Monitoring	Hotspot mapping	300,000	300,000	300,000	2022 & 2028
	Impact and severity monitoring	600,000	600,000	600,000	2022 & 2028
	Community attitude tracking	300,000	300,000	300,000	2022 & 2028
	Performance measurement	700,000	700,000	700,000	2022 & 2028
Total		20,000,000	19,400,000	15,300,000	

The activities in Table 3 are explained in detail below reasoning why it has to be carried out:

- 1. Education program:** The direct and indirect negative interactions between human and wildlife arises conflict range. Nyhus et al., (2000) reported that it can harm and lead to negative human attitudes with decreased appreciation for wildlife which can have severe

damage on conservation. Therefore, it is necessary to educate people on ecological protection, ecological importance of elephant, forest resources protection, and use scientific means to restore the quality of the Asian elephants' habitat and increase the surface area of the habitat in combination with local cultural tradition and customs to make people more receptive and tolerant to elephants and conscious of elephant protection.

2. **Alternative livelihood programs:** Due to crop raids and property damage farmers suffer economic losses which intensifies conflict between people and elephants and reduces their willingness to protect it. Alternative income sources from poultry farm, piggery farm, dairy farm, fishery farm, etc. established in the village may be enhanced by looking out for value chain for the products to mitigate the problem.
3. **Consultation workshop:** People are linked to information for effective monitoring, regular reports are made available and they participate in a conflict reporting.
4. **Partners for protection:** Communities in the pilot project areas should be made to participate in patrolling, policing and monitoring of community forest areas. An anonymous or public informant network should be in place and made operational.
5. **Habitat enrichment:** The increasing human activities are affecting every ecosystem on earth leading to decline in wildlife habitat quality and decrease in natural food sources available to wildlife (Foley et. al, 2018). These result to increase in human wildlife conflict (Rushton et al, 2006). An elephant needs 135–300 kg of food in a day to meet its living conditions (Sukumar, 1989). It needs tens of square kilometers of area to meet the required food consumption (Xu, 2004). Therefore, the habitat should be protected from shrinking, fragmenting and perforating. It is generally the edges that are the focal points for conflicts (Hart & O'Connell, 1998), hence it should be stabilized. Habitat should be maintained and enriched to support wildlife population. Develop forest cover and food resources such as palatable species, salt licks, waterholes, etc. and minimize disturbances. Mitigate other potential drivers that lead to increasing straying of wildlife in human dominated areas.
6. **Spatial Plan for the area:** The spatial plan developed for management of elephant habitat should be recognized by other government agencies and not randomly overlapped with other developmental activities exploiting with disregard for the plan.
7. **Community forest management:** The elephants are highly dependent on forest cover for food and habitat. Elephant abundance was positively associated with forest cover (NCD,

2018. Elephants need large open or closed forest cover to meet their ecological needs. It provides food and shelter, breeding grounds, and also helps with thermoregulation during the day. If the forest cover falls below the threshold, it is expected to cause conflict. Therefore, we need to maintain forest cover by managing community forest. People in the pilot areas must ensure operationalize, patrol, monitor and investigate illegal activities in the community forest areas.

- 8. Law enforcement:** People lack knowledge on the detailed effects of law on HWC and conservation conflicts in general. The ineffectiveness of law is primarily attributed to lack of implementation, support and enforcement. It is assumed that the law is one potential institution that affects human values and attitudes to wildlife (Woolaston et al., 2021) and can affect HWC. Law significantly influences on human behavior in circumstances of HWC by overcoming cultures, boundaries, and conflicts. Without enlightening on law, carrying out conservation work using law enforcement may not be publicly acceptable and it would risk conservation outcomes. Therefore, people should be created awareness on laws and it should be enforced through recognized means such as Rangers, Police personnel, citizen scientists, etc. and make habitat protection effective. People must be made to comply with law.
- 9. Physical structures/barriers constructed:** Construction of elephant barriers such as rubble walls, trenches and canals, biological and electric fences, deployment of alarms and development of communication systems. Physical structures or barriers are often seen as the enduring solution in human-elephant conflict situations (Nelson et. al. 2003). The quality of the physical barrier is important, but it is also important to consider fence-breakers. Electric fence has been most effective barrier against elephant depredation, but its success depended on proper periodic maintenance of the fence. Physical barrier should be placed to prevent access to agriculture field and private property, but not on common wildlife migratory passages to avoid damages by elephants. In situations where a barrier is constructed across elephant home ranges, inaccessibility and loss of resources can greatly jeopardize their survival. To construct physical barriers have to consider natural issues such as facilitating corridors and smooth movement (Goswami and Vasudev, 2017).
- 10. Invasive species are cleared or managed:** Invasive species can impact balance on plant species on which wildlife depend. It competes with native species for moisture, sunlight,

nutrients and space (NRCS, 2006) resulting in decreased plant diversity. Wildlife habitat is degraded by establishment and spread of invasive species. Weeds also provide very good cover to predators. Research in India showed that high proportion of cattle kills were correlated with proximity to invasive weeds. The removal of such weeds takes away the cover of that predator improving wildlife habitat.

11. Wildlife-friendly farming: Household incomes protected by government in the event of natural disaster, disease, or HEC through a compensation/insurance scheme. There is exploration of improved livestock breeds, management, and cropping techniques. Crops have barriers separating from wild habitat. Local grazing area is followed and livestock don't enter into wildlife habitat for grazing.

12. Safe movement corridor: With developmental activities taking place in the pilot project areas, deforestation takes place leading to habitat loss and fragmentation of elephant. Gradually human settlement and elephant habitat overlap. Elephants will inevitably cause losses when they pass through residential areas in the process of migration. As a result, HEC causes economic losses, threatens daily activities and safety of people. Su et. al, (2020) recommends that wildlife corridors should be built to connect the fragmented and isolated habitats of elephants and also to avoid the damage caused during migration process of elephants. Corridors can serve as a magnet for wildlife that are looking for safe passage and cover, and can lure wildlife away from crop and grazing fields, and community areas. Once corridors are broken wildlife may have no other option than to pass through human settlements that have moved there. Therefore, movement corridors to allow elephant to move safely between habitats should be made available considering natural and historical corridors being left for wildlife to pass through.

13. Rapid response teams are equipped and trained: The rapid response team (RRT) is very important in the HEC. It is the first to be notified by victim in an event of conflict. The rapid RRT is used as first responders following conflict events. It is important to efficiently establish, operate, monitor, and sustain. RRT should have sufficient funds to cover the costs of carrying out their functions (Barlow & Brooks, 2019). The frontline workers of human-elephant conflict should benefit from being a member of RRT or otherwise be demotivated. Therefore, RRT members should be equipped, trained and be functional to respond to HEC actively.

- 14. Hotspot mapping:** Identifying hotspots of human–wildlife conflict and understanding their potential drivers is important. Therefore, to identify the HEC hotspots in the in pilot project areas and to investigate the relationship between the ongoing HEC and associated drivers in the landscape. it would help in the prioritization of areas for the conservation and formulation of future strategies to address the issue.
- 15. Impact and severity monitoring:** The tolerance of people and a better understanding of elephant as pest must be raised by conservationists (Naughton et. al, 1999). We should determine whether complaints of people match the economic impact of elephants on agricultural communities, why HEC is intensifying in the pilot project areas and how to protect vulnerable individuals from losses while maintaining elephants for regional and global benefits. The clear understanding of the human and financial cost of conflict should also be understood.
- 16. Community attitude tracking:** The attitude and behavior of people directly affect the effective implementation of conservation policies and coexistence of people and wildlife (Frank et. al, 2015). It is necessary to study the current status of HEC, the knowledge, attitude and practices of people on elephant, the causes of HEC and mitigation support required to reduce the HEC. Studies have found that the people affected by HEC had more negative attitude towards elephant whereas people who were not affected by HEC had more tolerance and positive attitude. Therefore, we should track and consider their attitude to plan and effectively protect the elephant.
- 17. Performance measurement:** Performance measurement is important because of the fact that it improves the performance and the output of a project. The measurement shows which area lack and which area needs to be up-scaled. The project managers and implementers should know if their programs are achieving desired goals. Therefore, performance measurement is a process to understand, manage and improve the functioning state of a project.

6. Monitoring and Evaluation

Monitoring is an assessment of the implementation of an activity which seeks to establish the extent to which input deliveries, work schedules, other required actions and targeted outputs are proceeding according to plan, so that timely action can be taken to correct deficiencies detected.

And the evaluation attempts to determine the relevance, effectiveness, efficiency, and impact of activities in the light of stated objectives. Therefore, monitoring and evaluation is very important for effective HEC management because it helps to determine if it is achieving its desired results. The entire HEC management program is compromised, if HEC monitoring does not exist in the management system. As the SAFE systems approach represents a paradigm shift toward holistic management of HEC, there is no precedent integrated monitoring system to replicate. The development of effective monitoring systems by building a framework that supports the data collection with a focal person irrespective of whether there is a project or not, the analysis and use of data for management decisions, the broadening of the area covered by data collection, and the capture of data at a central HEC database. Through the continuous flow of data, HEC management team can keep track of the trend and make informed decision. Further, these data can be very useful inputs to evaluation of effective management of HEC which will form the basis for adaptive management and lesson learning for continuously improving HEC management. Therefore, the responsible organization or management must ensure that monitoring and evaluation is integrated into the HEC management system so that the desired goal of HEC management is achieved.

The monitoring and evaluation plan of the HEC project is as shown below Table 4.

Table 4: Monitoring and Evaluation plan

Goals Good goals are SMART and linked to biodiversity, human welfare, or footprint reduction.	Success Indicator	Baseline	Planned Intermediate Result (PIR) by 2028					
			2023	2024	2025	2026	2027	2028
Goal/Impact: To promote harmonious co-existence of human with elephant and nature.	1.Tolerance level of community towards wildlife	HEC rapid assessment result	40%	50%	60%	70%	80%	90%
Outcome: By 2028, Community of Gelephu, Samtenling and	1.% safe level of people	HEC rapid assessment result	69%	75%	80%	85%	90%	95%

Shompangkha is made safe from human elephant conflict.	2.%safe level of assets	HEC rapid assessment result	59%	65%	70%	75%	80%	90%
	3.% safe level of wildlife	HEC rapid assessment result	67%	75%	80%	85%	90%	95%
	4.%safe level of habitats	HEC rapid assessment result	52%	60%	70%	75%	80%	90%
Outputs	Success Indicator	Baseline	Planned Intermediate Result (PIR) by 2028					
			2023	2024	2025	2026	2027	2028
1.By 2028, wildlife habitat of elephant enriched/restored	1. Hectares (ha) of area intervened	Plantation of palatable fodder and removal of bushes and invasive species	10	10	10	10	10	10
	2. Number and types of habitat restoration work	12 nos. waterhole 12 nos. saltlicks	2	2	2	2	2	2
2. By 2028, Physical structures/barriers constructed and maintained.	Length (km) of electric fence, trench, etc. functional	30 km	5	5	5	5	5	5
4. Rapid Response Team (RRT) trained and equipped.	RRT team in place and functional.	3 times	0	1	0	1	0	1

5. By 2028, alternative livelihood programs are in place and functional.	Number of livelihood programs report	6 nos.	1	1	1	1	1	1
6. By 2023, developed spatial plan for the pilot area	No. of plan	3	3	0	0	0	0	0
7. By 2028, wildlife friendly farming developed and operational	% of farming practiced by farmer	N. A	40%	50%	60%	70%	80%	90%
8. By 2028, safe corridor movement in place and functional	Number and area of elephant corridor	6	1	1	1	1	1	1
9. By 2023, hotspot mapped, impact and severity known and community attitude tacked	HEC hotspot map	3	3	0	0	0	0	0
	Reports on impact severity and community attitude	3	0	1	0	1	0	1
10. By 2023, Partners for protection and conflict information system in place and operational	No. of partners for protection deployed	6	6	0	0	0	0	0
11. By 2028, Community Forest managed by people	Number of community forest	5	1	1	1	1	1	0
12. By 2028, people well aware law enforced and complied	% safe elephant	HEC rapid assessment result	67%	75%	80%	85%	90%	95%
	% safe habitat		52%	60%	70%	75%	80%	90%

13. Project performance measured every year	No. of report	7	1	1	1	1	1	1
14. By 2028, Educated people on conservation.	% of people educated	90%	15%	30%	45%	60%	75%	90%

The measurement of monitoring against three main impact goals (WWF, 2016) as follow:

- i. Decreased incidence, frequency, severity, and intensity of HEC incidents
- ii. Maintenance of community attitude and increased tolerance
- iii. The incidence of retaliatory wildlife killing is decreased.

After the implementation of interventions, it is also important to measure again the scores of all the elements of HEC and the final outcomes such as making People, Wildlife, Assets and Habitat safe (WWF, 2018) to compare with the baseline and to know improvement brought about by implementation of interventions.

7. Way Forward

The strategic actions and activities for the 3 ongoing HEC pilot project areas are developed during the implementation of HEC project based on low SAFE baseline determined after RA. It is the responsibility of DFO, Sarpang to look for funds from potential donors such as International Climate Initiative (IKI) project to implement the HEC SAFE strategy.

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10. Annexure

10.1 List of participants for the workshop

1. Ugyen Wangchuk, Gup, Gelephu Gewog
2. Kumar Monger, Gup, Samtenling Gewog
3. Suk Dorji Yonzan, Gup, Shompangkha Gewog
4. Laxu Mann Geshing, Tshogpa, Shompangkha Gewog
5. T. P. Homagaon, HEC Chairman, Shompangkha Gewog
6. Mdhu Devi Baniya, Agriculture ES, Shompangkha Gewog
7. Pem Choden, Livestock ES, Shompangkha Gewog
8. Gyem Lhamo, Livestock ES, Shompangkha Gewog
9. Ash Mann Rai, Mangmi, Shompangkha Gewog
10. Jambay Lhamo, Agriculture ES, Samtenling Gewog
11. Sonam Choden, Livestock ES, Samtenling Gewog
12. Tshewang Peldon, Tshogpa, Samtenling Gewog
13. Kharka Brd. Rai, HEC Chairman, Samtenling Gewog
14. Neela Kanta Timsina, Livestock ES, Gelephu Gewog
15. Tshering Yangden, Sr. AES, Gelephu Gewog
16. Tashi Dema, GAO, Gelephu Gewog
17. Jigme Zangmo, SFR-III, Gelephu Range
18. Dago Dorji, SFR-III, Gelephu Range
19. Manoj Bomzan, SFR-III, Gelephu Range
20. Jigme Dorji, FR-II, Gelephu Range
21. Rinzin Wangchuk, Sr. Fr., Gelephu Range
22. Sangay Dorji, Dy. CFO, SWRRC
23. Netra Prasad Battarai, VO, SWRRC
24. Karma Choki, FO, SFD
25. Kezang Dhendup, SFR-I, SFD
26. Sangay Dorji, SFR-I, SFD
27. Tashi Wangdi, SFR-I, SFD
28. Kelzang Wangmo, FR-II, SFD
29. P. B. Monger, Sr. Fr., SFD

30. Lhabchu Tshering, SFR-I, Sarpang Range

31. Neten Tshering, Sr. FR, Sarpang Range

32. Yeshi Dema, Sr. Fr, Sarpang Range

33. Yeshi Dorji, Sr. Fr, Sarpang Range

10.2 HEC Rapid Assessment Questions and Criteria

Strategic Outcome	Strategic Intent	Criteria	Effectiveness	Primary element
Safe Person	Does not hunt wildlife	Laws are enacted to protect wildlife.	1: Laws are by personal agreement only with no means to be enforced; 2: Laws are in place and with minimal physical, financial and human resources for effectiveness enforcement and punishment, and are generally known by affected people 3: Laws are in place with less than 75% of the physical, financial and human resources needed for effective enforcement and punishment and laws are well known by affected people 4: Laws are stipulated and recognized by national government, and have extensive means to be enforced everywhere.	Policy
Safe Person	Does not hunt wildlife	Laws enforced by any officially recognized entity: rangers, citizen scientists, patrol units, military etc. Is the site patrolled?	1: Patrolling is seldom done 2: Patrolling is up to 4 days p/mth 3: Patrolling is 5-14 days p/mth 4: Patrolling is 15 days or more p/mth	Prevention
Safe Person	Does not hunt wildlife	People are complying with the law. Wildlife protection laws are implemented effectively, and there is community compliance overall with these laws.	1: Wildlife crime incidents have increased over time 2: Are steady 3: Have decreased over time 4: Minimal to zero wildlife crime occurs	Prevention
Safe Person	Does not hunt wildlife	Judicial processes are fair. Consider if arrests are actually leading to prosecution, or does apathy or corruption impede the legal proceedings, rendering 'successful' field patrols/arrests, inadequate?	1: Following arrest judicial processes ensure fair trials and prosecution in 0-25% of cases 2: ...in 25-50% of cases 3: ...in 50-75% of cases 4: ...in 75-100% of cases	Policy
Safe Person	Participates as partners for protection	Communities participate in patrolling, policing, and monitoring of community forest areas.	1: 0-25% local participation 2: 25 – 50% of communities have people participating 3: 50 – 75 % of communities have people participating 4: 75 – 100 % of communities have people participating	Prevention
Safe Person	Participates as partners for protection	A locally applicable insurance / relief / compensation program for HEC is operational.	1: 0-25% local participation 2: 25 – 50% of communities have people participating 3: 50 – 75 % of communities have people participating 4: 75 – 100 % of communities have people participating	Mitigation

Safe Person	Participates as partners for protection	Personal informant networks are operational.	1: Zero patrols are conducted based on intelligence each month 2: 5% of patrols are conducted based on intelligence from the informant network each month 3: Up to 10% of patrols are conducted based on intelligence from the informant network each month 4: More than 10% of patrols are conducted based on intelligence from the informant network each month	Prevention
Safe Person	Participates as partners for protection	An anonymous or public informant network is in place and operational.	1: Low usage and knowledge of it locally 2: Local knowledge of it and low usage 3: Good local knowledge and growing use of it and leading to seizures 4: High usage and leading to an increase in seizures or patrols	Prevention
Safe Person	Does not venture into, forage, or conduct livelihoods activities inside designated PAs	Are people venturing into, foraging, or conduct livelihoods activities inside the PA?	1: Illegal activities inside the PA have increased over time 2: ...have remained steady over time 3: ...have decreased over time 4: ...are minimal or non-existent	Prevention
Safe Person	Does not use non protected forest resources unsustainably	Is resource extraction and use sustainable in the buffer zone or community forest?	Livelihoods activities for subsistence or income OUTSIDE the PA: 1: Are increasingly intense and have led to extensive forest and species loss 2: Are steady and are leading to gradual forest and species loss 3: Have decreased over time, with forest resources able to recover from losses 4: Are minimal and forest and resource use is balanced with recovery	Prevention
Safe Person	Is not directly exposed to conflict	Are people safe from injury or death by wildlife?	Incidents of human injury or death by wildlife is: 1: ... increasing over time 2: ... steady 3: ... decreasing 4: ... minimal or zero	Prevention
Safe Person	Conducts wildlife-friendly farming	Livestock are guarded and herded during the day (6am - 6pm)	1: Number of livestock killed during the day has increased over time 2: ... has remained steady over time 3: ... has decreased over time 4: ... is almost non-existent now	Prevention
Safe Person	Conducts wildlife-friendly farming	Are livestock fenced / enclosed / tethered at night? (6pm-6am)	1: Number of livestock killed during the night is increasing 2: ... has remained steady over time 3: ... has decreased over time 4: ... is almost non-existent now	Prevention

Safe Person	Conducts wildlife-friendly farming	<p>Locally applicable grazing areas are complied with.</p> <p>In order to reduce likelihood of livestock loss, communities can, in addition to herding, have agreed grazing areas to avoid livestock straying into predators' habitat.</p> <p>Grazing areas could be in the form local customs re grazing areas etc or a Land Use Plan that the community has developed, or it might be something simpler like a community agreement to not graze in particular areas</p>	<p>1: No agreed grazing area exists</p> <p>2: Number of livestock killed outside grazing areas has increased over time</p> <p>3: Number of livestock killed outside grazing areas has decreased over time</p> <p>4: Minimal or zero livestock are killed or injured outside grazing areas. Grazing areas are in place, have herding, and guarding at night.</p>	Prevention
Safe Person	Conducts wildlife-friendly farming	<p>Crops are consistently guarded.</p> <p>Consider if there is a crop protection plan in place and it is being complied with.</p> <p>Are there any community agreements to not clear or encroach into agreed areas for crops etc i.e. a verbal or formal agreement.</p> <p>Consider: crop fields are protected with trenches / fences; trenches / fences are well maintained; unpalatable crops are planted as buffer between habitat and crop fields; people do not leave other attractants (e.g. waste, meat, salty clothing, drums with alcoholic drinks etc.) in close proximity to their homes; and individuals / communities / government have organized patrol units for early warning & hazing / chasing.</p>	<p>1: Crop loss has remained high or is increasing over time</p> <p>2: ... has remained steady over time</p> <p>3: ... has decreased over time</p> <p>4: ... is almost non-existent now</p>	Prevention
Safe Person	Conducts wildlife-friendly farming	Do crops have barriers separating them from habitat?	<p>1: 75-100% of crops raided do not have barriers</p> <p>2: 50-75%</p> <p>3: 25-50%</p> <p>4: 0-25%. The majority of crops have effective barriers and are not being raided.</p>	Prevention
Safe Person	Conducts wildlife-friendly farming	Are crops given extra protection during peak HEC times?	<p>1: Crop loss during peak conflict times has increased over time</p> <p>2: ... has been steady over time</p> <p>3: ... has decreased over time</p> <p>4: ... is minimal or almost zero</p>	Prevention
Safe Person	Has the ability, means and right to implement preventative measures	Do communities have the skills to put in place preventative measures?	<p>1: People use only their existing skills knowledge</p> <p>2: use mostly their existing skills but have access to some information and lessons from elsewhere using local means</p> <p>3: have access to some lessons and ideas and techniques from other places using media sources and online</p> <p>4: have extensive access to lessons and techniques from external sources using media, online sources, and also have access to training and workshops</p>	Prevention

Safe Person	Has the ability, means and right to implement preventative measures	Funds are available for local people to develop their own solutions in prevention.	1: People use their own money 2: People use mostly their own money and borrow from relatives or micro-credit 3: People combine their own money with micro credit loans, and have access to some grants for prevention 4: People can readily access micro credit, grants from innovations funds or from government, to put in place preventative measures	Prevention
Safe Person	Has the ability, means and right to implement preventative measures	Farmers and communities have the right to modify the land for prevention.	1: People are not able to make any modifications to the land at all 2: People can make only few modifications to the land 3: People can make many modifications to the land based on local agreement 4: People have complete rights over their land and can do whatever they choose on it	Prevention
Safe Person	Has the ability, means and right to implement preventative measures	There are channels / mechanisms to exchange and expand successful preventative measures locally to be demonstrated & are supported to be expanded locally and/or applied elsewhere.	1: Preventative measures stay just at a household or village level; 2: A few measures have been expanded within the immediate area; 3: Some measures have been replicated outside the immediate area; 4: Some measures have been given further grants and expanded locally, adopted by other villages, or adopted by government or private sector as a solution.	Prevention
Safe Person	Has safe working environments, agricultural fields and life styles	Managers and employers of plantations have committed to safe working practices.	Human injury or death inside plantations or the adjacent habitat 1: has increased over time 2: is steady 3: has decreased over time 4: is minimal or zero	Prevention
Safe Person	Has safe working environments, agricultural fields and life styles	Managers and employers of National Park, military or police staff have committed to safe working practices.	Human injury or death inside National Parks and protected areas for employed staff: 1: has increased over time 2: is steady 3: has decreased over time 4: is minimal or zero	Prevention
Safe Person	Has safe working environments, agricultural fields and life styles	Outside workers have a plan or system in place to protect them. This could be an early warning system.	1: Human injury or death when working in the fields or forest has increased over time 2: has remained steady over time 3: has decreased over time 4: is now minimal or zero	Prevention
Safe Person	Has safe working environments, agricultural fields and life styles	People avoid high risk areas and high risk times in their daily lives to minimize HEC events and exposure to contact.	1: Human injury or death when doing non-livelihoods activities (going to school, bathroom, playing etc) has increased over time 2: has remained steady over time 3: has decreased over time 4: is now minimal or zero	Prevention

Safe Person	Has household incomes not significantly sensitive to conflict	Income diversification activities are underway across communities.	1: HEC incidents negatively impact 75-100% of household incomes 2: 50-75% of household incomes 3: 25-50% of household incomes 4: 0-25% of household incomes	Mitigation
Safe Person	Has household incomes not significantly sensitive to conflict	Alternative livelihood programs are in place.	1: 75-100% of people depend on livelihoods which are prone to HEC 2: 50-75% 3: 25-50% 4: 0-25% of people depend solely on livelihoods prone to HEC. They have several other income streams to fall back on	Mitigation
Safe Person	Has household incomes not significantly sensitive to conflict	Projects or programs are underway to help local communities access markets, or do training, or access jobs.	1: Very few people are participating in any programs other than basic subsistence livelihoods 2: Participation in non-natural resources related livelihoods is low 3: Participation in non-natural resources related livelihoods is high and people are increasingly getting jobs outside or selling goods to markets further afield 4: Many people derive incomes from jobs and services that are not linked to HEC	Mitigation
Safe Person	Participates in a conflict reporting mechanism	A locally applicable reporting mechanism is in place.	1: Reports are either never made or made 1-6 mths from event 2: Reports are made 1 week-1 mth from event 3: Reports are made 1 -7 days of the event 4: Reports are made within 0 hours - 1 day of the event	Response
Safe Person	Participates in a conflict reporting mechanism	All human injuries and death events reported.	1: 0-33% of events are reported 2: 33-66% of events are reported 3: 66-90% of events are reported 4: 90-100% of events are reported	Response
Safe Person	Participates in a conflict reporting mechanism	All livestock loss events reported.	1: 0-33% of events are reported 2: 33-66% of events are reported 3: 66-90% of events are reported 4: 90-100% of events are reported	Response
Safe Person	Participates in a conflict reporting mechanism	All crop loss events reported.	1: 0-33% of events are reported 2: 33-66% of events are reported 3: 66-90% of events are reported 4: 90-100% of events are reported	Response

Safe Person	Participates in a conflict reporting mechanism	All structural damage and loss events reported.	1: 0-33% of events are reported 2: 33-66% of events are reported 3: 66-90% of events are reported 4: 90-100% of events are reported	Response
Safe Person	Participates in a conflict reporting mechanism	All retaliatory killing events reported.	1: 0-33% of events are reported 2: 33-66% of events are reported 3: 66-90% of events are reported 4: 90-100% of events are reported	Response
Safe Person	Is supported by locally based Response Teams	Response Teams are in place, equipped, trained and functioning.	1: Response times are over 1 week 2: 2-7 days 3: 1-2 days 4: 0-24 hours	Response
Safe Person	Has access to a conflict information system	Information system is in place, is linked to Effective Monitoring, and regular public reports are made available.	1: Information on conflict events and trends is disseminated to local people once a year 2: 1- 3 times per year 3: 3-12 times per year 4: More than once a month	UtC
Safe Person	Contributes to or adheres to a HEC management system / plan	A recognized (by communities and government) HEC management is in place.	1. There is no coordination for HEC. Individuals just do their own protection measures. 2: There is coordination within village level only 3: There is coordination between villages 4: There is coordination at the district or higher level for HEC through a plan	Policy
Safe Person	Participates in community events for conservation	Ongoing education program is in place re conservation and species.	1. 0-33% of people in target areas participate 2: 33-66% of people in target areas participate 3: 66-90% of people in target areas participate 4: 90-100% of people in target areas participate	Prevention
Safe Person	Does not feel fearful undergoing their daily lives	A system is in place to understand and reduce local sentiments around conflict. People must feel secure in going about their daily lives. Eg going to and from school or markets or work. Community perceptions of conflict and fear can build to become disproportionate with the actual conflict, and could lead to active removal or killing wildlife before an incident takes place.	1. Communities have multiple areas off limits and daily activities are increasingly curtailed due to fear 2. Communities have multiple areas off limits and daily activities are sometimes curtailed due to fear 3. Communities have a few areas off limits and daily activities are rarely curtailed due to fear 4. Communities have very few areas off limits and daily activities are never curtailed due to fear	Mitigation

Safe Wildlife	Wildlife are not hunted, and their habitat secured	Laws are enacted to protect wildlife.	1: Laws are by personal agreement only with no means to be enforced; 2: Laws are in place and with minimal physical, financial and human resources for effectiveness enforcement and punishment, and are generally known by affected people 3: Laws are in place with less than 75% of the physical, financial and human resources needed for effective enforcement and punishment and laws are well known by affected people 4: Laws are stipulated and recognized by national government, and have extensive means to be enforced everywhere.	Policy
Safe Wildlife	Wildlife are not hunted, and their habitat secured	Laws enforced by any officially recognized entity: rangers, citizen scientists, patrol units, military etc. Is the site patrolled?	1: Patrolling is seldom done 2: Patrolling is up to 4 days p/mth 3: Patrolling is 5-14 days p/mth 4: Patrolling is 15 days or more p/mth	Prevention
Safe Wildlife	Wildlife are not hunted, and their habitat secured	People are complying with the law. Wildlife protection laws are implemented effectively, and there is community compliance overall with these laws.	1: Wildlife crime incidents have increased over time 2: Are steady 3: Have decreased over time 4: Minimal to zero wildlife crime occurs	Prevention
Safe Wildlife	Wildlife are not hunted, and their habitat secured	Judicial processes are fair. Consider if arrests are actually leading to prosecution, or does apathy or corruption impede the legal proceedings, rendering 'successful' field patrols/arrests, inadequate?	1: Following arrest judicial processes ensure fair trials and prosecution in 0-25% of cases 2: ...in 25-50% of cases 3: ...in 50-75% of cases 4: ...in 75-100% of cases	Policy
Safe Wildlife	Are separated from people, livestock and crops and rarely stray into human habitation	Locally applicable barriers, fencing, early warning systems and zoning are in place and functioning.	1: Conflict events increased over time 2: Have remained steady over time 3: Have decreased over time 4: Are minimal or almost zero	Prevention
Safe Wildlife	Can co-exist with people	Wildlife is perceived positively locally and support for their protection is linked to livelihoods or community development.	1: Zero livelihoods actions are linked to wildlife, habitat or services; 2: Some actions are linked to wildlife, and habitat; 3: Many actions are linked to wildlife and habitat; 4: Almost all actions are linked to wildlife and habitat conservation.	Prevention
Safe Wildlife	Can co-exist with people	Wildlife are not being killed in retaliation for, or to prevent conflict events. Where community tolerance has been breached, retaliatory killings may occur, or people may act to remove animals from the area in advance of any event.	1: Wildlife are increasingly killed, poisoned 2: Wildlife killings are steady 3: ...are decreasing 4: ...are zero or minimal	Prevention
Safe Wildlife	Are supported by locally based Response Teams	Response Teams are in place, equipped, trained and functioning.	1: Response times are over 1 week 2: 2-7 days 3: 1-2 days 4: 0-24 hours	Response

Safe Wildlife	Have a secure, connected and healthy habitat	Wildlife habitat is protected under law or local agreement.	<p>1: Laws are by personal agreement only with no means to be enforced</p> <p>2: Laws are in place and with minimal structure for enforcement and punishment, and are generally known by affected people</p> <p>3: Laws are in place with substantial means for enforcement and punishment and well known by affected people</p> <p>4: Laws are stipulated and recognized by national government, have extensive means to be enforced.</p>	Policy
Safe Wildlife	Have a secure, connected and healthy habitat	<p>Linear infrastructure (fences, train lines, roads etc) are not exacerbating HEC.</p> <p>Barriers such as electric fencing or busy road networks can divert/channel wildlife into available passages and thereby increase HEC in other areas. Consider if linear infra planning is taking into consideration the large scale, and taking into consideration the long term wildlife passages/corridors.</p>	<p>1: Wildlife are increasingly being killed or injured on or at linear infrastructure</p> <p>2: Wildlife deaths or injury at linear infra are steady</p> <p>3: Wildlife deaths or injury at linear infra are decreasing over time</p> <p>4: Wildlife deaths or injury at linear infra are minimal or zero.</p>	Prevention
Safe Wildlife	Have a secure, connected and healthy habitat	<p>Movement corridors are present that allow wildlife to move safely between habitats.</p> <p>Consider if natural and historical corridors are being left for wildlife to pass through. Once corridors are broken wildlife may have no other option that to pass through human settlements that have moved there. Corridors can serve as a magnet for wildlife who are looking for safe passage and cover, and can lure wildlife away from crop and grazing fields, and community areas.</p>	<p>1: Wildlife are increasingly being killed or injured in unprotected areas they are moving in</p> <p>2: Wildlife deaths or injury in unprotected areas are steady</p> <p>3: Wildlife deaths or injury in unprotected areas are decreasing over time</p> <p>4: Wildlife deaths or injury in unprotected areas are minimal or zero.</p>	Prevention
Safe Wildlife	Have a secure, connected and healthy habitat	<p>Habitat is healthy and supports maintenance of wildlife populations.</p> <p>Consider access to mosaic ecosystems, forest cover, waterholes, salt licks etc. and with minimal disturbance re construction, mining, and linear infra.</p> <p>Consider any increases in straying wildlife into human dominated areas, and potential drivers of that.</p>	<p>1: Wildlife are increasingly straying into human fields and settlement areas</p> <p>2: ...straying is steady</p> <p>3: straying is decreasing over time</p> <p>4: straying is minimal or zero.</p>	Prevention
Safe Wildlife	Are safe in plantations that connect or fringe habitat	<p>Managers and employers of plantations have a system in place to maintain theirs and wildlife safety.</p> <p>adherence to law preventing killing of species by staff.</p>	<p>1: Wildlife injury or mortality is high or increasing inside plantations</p> <p>2: is steady</p> <p>3: is decreasing</p> <p>4: is minimal or zero</p>	Prevention

Safe Wildlife	Are no less secure as they exit the area or cross borders	Wildlife have similar level of protection and habitat as they move between the immediate area and outside. This is most applicable to trans boundary contexts. Consider if the adjacent area outside the site has the same policies / laws for wildlife if they stray there? ie are species still protected if they leave the site?	1: Wildlife are highly vulnerable and almost certain to come into conflict / be killed / hunted / poached if they leave the site. 2: Some individuals will come into conflict / be killed/ hunted / poached if they leave the site. 3: Few individuals will come into conflict / be killed / hunted / poached if they leave the site. 4: No individuals are likely to come into conflict nor vulnerable to be killed if they leave the site.	Policy
Safe Wildlife	Are understood	Research is conducted to build knowledge of species behavior, dynamics, predator/prey relationships etc. Better understanding of the dynamics and relationships and behaviors of species locally can contribute to better knowledge on hotspot prediction, where to situate preventative measures, and understanding why certain trends and behaviors are emerging or declining etc.	Research into wildlife, their behavior, interactions, and relationships has: 1: Never happened 2: Happened once 3: Been surveyed no less than once every 2 years 4: Been done regularly or is ongoing part of information collected by rangers and government offices and fed into management	UtC
Safe Assets	Are supported by government policy	Household incomes protected by government in the event of natural disaster, disease, or HEC through a compensation / relief / insurance scheme.	1: No national policy or mechanism is in place to compensate for loss of assets 2: A national policy is in place but resources are lacking for its effective delivery 3: A national policy is in place and resources available, but delivery is: not comprehensive; inconsistent; or is delayed in many cases 4: A national policy is in place and resources available and delivery is effective and timely	Policy
Safe Assets	Are wildlife-friendly	Livestock are guarded and herded during the day (6am - 6pm)	1: Number of livestock killed during the day has increased over time 2: ... has remained steady over time 3: ... has decreased over time 4: ... is almost non-existent now	Prevention
Safe Assets	Are wildlife-friendly	Are livestock fenced / enclosed / tethered at night? (6pm-6am)	1: Number of livestock killed during the night is increasing 2: ... has remained steady over time 3: ... has decreased over time 4: ... is almost non-existent now	Prevention
Safe Assets	Are wildlife-friendly	Locally applicable grazing areas are complied with. In order to reduce likelihood of livestock loss, communities can, in addition to herding, have agreed grazing areas to avoid livestock straying into predators' habitat. Grazing areas could be in the form local customs re grazing areas etc or a Land Use Plan that the community has developed, or it might be something simpler like a community agreement to not graze in particular areas	1: No agreed grazing area exists 2: Number of livestock killed outside grazing areas has increased over time 3: Number of livestock killed outside grazing areas has decreased over time 4: Minimal or zero livestock are killed or injured outside grazing areas. Grazing areas are in place, have herding, and guarding at night.	Prevention

Safe Assets	Are wildlife-friendly	<p>Crops are consistently guarded.</p> <p>Consider if there is a crop protection plan in place and it is being complied with.</p> <p>Are there any community agreements to not clear or encroach into agreed areas for crops etc i.e. a verbal or formal agreement.</p> <p>Consider: crop fields are protected with trenches / fences; trenches / fences are well maintained; unpalatable crops are planted as buffer between habitat and crop fields; people do not leave other attractants (e.g. waste, meat, salty clothing, drums with alcoholic drinks etc.) in close proximity to their homes; and individuals / communities / government have organized patrol units for early warning & hazing / chasing.</p>	<p>1: Crop loss has remained high or is increasing over time</p> <p>2: ... has remained steady over time</p> <p>3: ... has decreased over time</p> <p>4: ... is almost non-existent now</p>	Prevention
Safe Assets	Are wildlife-friendly	Do crops have barriers separating them from habitat?	<p>1: 75-100% of crops raided do not have barriers</p> <p>2: 50-75%</p> <p>3: 25-50%</p> <p>4: 0-25%. The majority of crops have effective barriers and are not being raided.</p>	Prevention
Safe Assets	Enhanced farming practices are supported	<p>There is exploration of improved livestock breeds, management, and crops and techniques.</p> <p>This could be new breeds, new breeding regimes etc.</p>	<p>Livestock that are new, or managed in new ways:</p> <p>1: Have been increasingly lost over time</p> <p>2: ... have been lost steadily over time</p> <p>3: ... have been lost decreasingly over time</p> <p>4: ... are minimally lost or not at all</p>	Prevention
Safe Assets	Enhanced farming practices are supported	<p>There is exploration of using improved management, and crops and techniques.</p> <p>This could be new crops that are not attractants for herbivores, or crops that also act as fences/barriers.</p>	<p>Crops that are new, or managed in new ways:</p> <p>1: Have been increasingly lost over time</p> <p>2: ... have been lost steadily over time</p> <p>3: ... have been lost decreasingly over time</p> <p>4: ... are minimally lost or not at all</p>	Prevention
Safe Assets	Invasive species are cleared or managed	<p>A program or management plan for weeds is in place.</p> <p>Invasive weeds compete with crops and reduce household yields and can increase pressure for habitat clearing. Weeds also provide very good cover to predators and research in India shows that high proportion of cattle kills are correlated with proximity to invasive weeds. The removal of such weeds takes away the cover that predators like tigers and leopards require. Furthermore weeds compete with native fodder and habitat for wildlife.</p>	<p>1: is ad hoc and rarely done; 2: is planned and sometimes done; 3: is planned and done seasonally; 4: is planned, done regularly and sometimes is a source of revenue for local people</p>	Prevention
Safe Assets	Invasive species are cleared or managed	<p>A policy is in place to actively control invasive animal species.</p> <p>The policy might include legal provision for culling, removal of problem animals, sterilization etc. And would include strict provisions and guidelines.</p>	<p>1: No agreed policy or mechanism is in place to allow for active management</p> <p>2: An agreed policy or mechanism is in place but is never acted on</p> <p>3: ...is sometimes activated</p> <p>4: ... is activated based on local agreements or as per national policy</p>	Policy

Safe Assets	Invasive species are cleared or managed	Activities to actively control invasive wildlife species is in place. Problem animals could be culled or could be removed by response teams etc - within the confines of the law.	1: Invasive species are never actively controlled 2: A national policy is in place but is never acted on 3: A national policy is in place and is sometimes activated 4: A national policy is in place and is regularly activated	Prevention
Safe Assets	Structures are wildlife friendly	Physical structures, property and equipment are constructed, situated and managed to minimize damage from, and attractiveness to wildlife. Consider only stand-alone buildings. Are they being damaged by elephants? Do they have something inside that is attracting elephants to them? Physical structures should not be situated on common wildlife migratory passages, should be structurally sound so as to avoid significant damage from wildlife, and should not house any items, commodities, produce or waste that may attract wildlife.	1: Structures are increasingly damaged by wildlife; 2: Wildlife damage to structures is steady; 3: Wildlife damage to structures in decreasing; 4: Wildlife damage to structures is minimal or almost zero.	Prevention
Safe Habitat	Is protected	Laws are enacted to protect habitat.	1: Laws are by personal agreement only with no means to be enforced; 2: Laws are in place and with minimal structure for enforcement and punishment, and are generally known by affected people; 3: Laws are in place with substantial means for enforcement and punishment and well known by affected people; 4: Laws are stipulated and recognized by national government, have extensive means to be enforced.	Policy
Safe Habitat	Is protected	Laws are enforced through recognized means. Is there patrolling in the National Park that supports habitat protection, seizure and prosecution for clearing, logging and encroachment?	1: Patrolling is seldom done; 2: Patrolling is 0-4 days p/mth; 3: Patrolling is 5-14 days p/mth; 4: Patrolling is 15 days or more p/mth	Prevention
Safe Habitat	Is protected	Habitat protection is effective.	National park/Non-Protected Areas 1: Habitat loss has increased over time 2: Habitat loss has remained stable 3: Habitat loss has decreased over time 4: Habitat loss is zero	Prevention
Safe Habitat	Is protected	Natural habitat is not being converted. Consider land use change from natural forest to agriculture and other production or non-use area.	Natural forest and habitat: 1: Rate of conversion of remaining natural habitat has increased over time 2: Conversion rates are stable 3: Conversion rates have decreased over time, with patches of reforestation 4: Conversion is minimal or zero, with multiple areas of reforestation exist	Prevention

Safe Habitat	Is managed	A community managed forest is operational. This forest will act as the buffer to external threats.	A community managed forest is in place: 1: No structure for management, planning and resources are in place to support it; 2: A structure for management and planning for sustainable use is in place but no resources to support it; 3: A structure for management and planning for sustainable use is in place, and some resources are available to support it; 4: A structure for management and planning for sustainable use is in place, has extensive resources and community support to be implemented over time.	Policy
Safe Habitat	Is managed	The community forest is covered by patrolling, monitoring and investigation of illegal activities.	1: Patrolling is seldom done; 2: patrolling is 0-4 days p/mth; 3: patrolling is 5-14 days p/mth; 4: patrolling is 15 days or more p/mth	Prevention
Safe Habitat	Is represented in a Spatial Plan for the area	A spatial or land use plan is operational for the area. Showing that the habitat is recognized as part of a wider plan and wider landscape mosaic. And not randomly being exploited with disregard for all other factors in that area.	1: No spatial plan exists. 2: Exists, but only at village/community level, but has not been formalized by relevant government planners and decision-makers; 3: Is at right scale and is accepted by government and communities but not incorporated within planning or sector plans; 4: is accepted and reflected in government and sector plans.	Prevention
Safe Habitat	Is not shrinking	Habitat size is staying the same.	The area of natural habitat: 1: Is almost zero 2: Has decreased over time 3: Has remained steady over time 4: Has increased over time	Prevention
Safe Habitat	Is not fragmenting	Forest connectivity is maintained.	The total number of natural forest patches: 1: Is almost zero 2: Has increased over time 3: Has remained steady over time 4: Has decreased over time	Prevention
Safe Habitat	Is not perforating	Clearings and perforations are not emerging.	The total area of perforations in natural forest patches: 1: Has increased over time 2: Has remained steady over time 3: Has decreased over time 4: Shows no change over time	Prevention
Safe Habitat	Has a stable edge distance	The forest edge is stable.	The total perimeter/edge of natural forest: 1: Has increased over time 2: Has remained steady over time 3: Has decreased over time 4: Shows no change over time	Prevention

Monitoring	Hotspot mapping	Hotspots been mapped.	1: mapped only once; 2: mapped and updated every 5-10 years; 3: mapped and updated every 1-2 years and fed into management; 4: mapped and updated every year and fed into management decisions and actions	M & E
Monitoring	Impact and severity monitoring	Is there a clear understanding of the human and financial cost of conflict locally?	1: surveyed only once; 2: surveyed every 5-10 years; 3: surveyed every 1-2 years; surveyed and collated every year and fed into management.	M & E
Monitoring	Community attitude tracking	Are community attitudes and tolerance to wildlife known?	Surveys conducted :1 once; 2: every 5-10 years; 3: every 1-2 years; 4: ongoing and fed into management	M & E
Monitoring	Performance measurement	Do managers and decision makers know if their programs are achieving desired goals?	1: 0-25% decisions are based on M&E; 25-50% made based on M&E; 3: 50-75%; 4: 75-100%.	M & E