



Developing strategies to mitigate Human Wildlife Conflict in the Sikkim Himalayas, India



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Acronyms

HWC	Human Wildlife Conflict
ATREE	Ashoka Trust for Research in Ecology and the Environment
KBS	Kitam Bird Sanctuary
BRS	Barsey Rhododendron Sanctuary
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
EDC	Eco Development Committee
DFO	Divisional Forest Officer
RO	Range Officer
BO	Block Officer
PRA	Participatory Rural Appraisal
NGO	Non Governmental Organisation
HH	Household
IBA	Important Bird Areas

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Executive Summary

Sikkim comprises 0.22% geographic area of India but has a very wide altitudinal gradient (300 m to 8598 m). Thus within a small geographic area the state has very high biodiversity. 47.62% of the land in Sikkim is under forest cover. Of this 82.31% is under state management and of this almost 31% is under the protected area system. Therefore, there is diverse wildlife species, living in close proximity to human settlements, leading to regular human wildlife interaction most of which are negative leading to Human Wildlife Conflict (HWC),

A study undertaken in four villages in the fringe areas of Kitam Bird Sanctuary and Barsey Rhododendron Sanctuary revealed that the impacts of small mammals, including herbivores are high, in contrast to the damages caused by large mammals. However, the policies pertaining to wildlife damage focus only on larger mammals as these are the main species in the mainland. Damage to the cash and food crops which provide livelihoods sustainability to communities were higher than direct encounters with wild animals. The availability of scientific information regarding these damages and its management is scarce, resulting in problems while developing strategies to mitigate HWC. The study further suggests different approaches and viable community based strategies for better management and mitigation of HWC.

Communities residing in the fringe areas with low socio-economic status were not able to access high investment HWC mitigation measures. Thus the project aims to link these to various government schemes where the convergence can be made.

I. Background

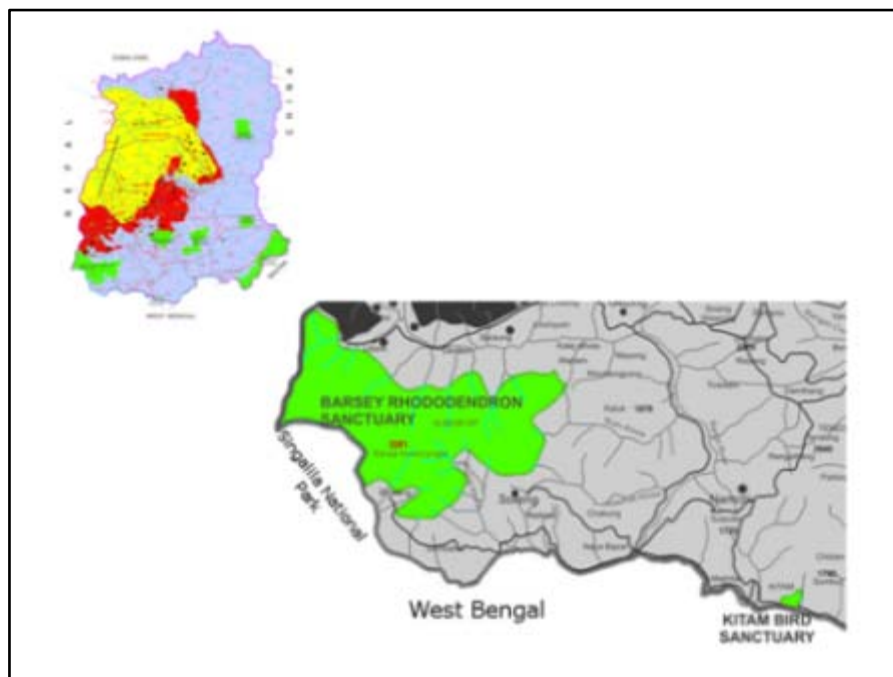
Human-wildlife conflict is usually depicted as the conflict that occur between the people and wildlife (Woodroffe et al 2005), actions by either humans or wildlife that affects the other adversely (Conover 2001), the perception that the safety, health, property and food of the humans are threatened by wildlife (Redpath et al 2013), or the threats to human life, economic security or recreation posed by the wildlife (Treves et al 2003). It occurs mainly due to the overlap of resources amongst man and wild animals.

The Sikkim Himalaya is one of the 22 agro-biodiversity hotspots in India. Only 12.3% of the land in Sikkim is available for cultivation, including currently used and fallow land. But more than 75% of the Sikkim's populations are dependent on agriculture (Kumar 2012). The state is bestowed with high biodiversity wealth harbouring around 40% of the biodiversity that occurs in the Indian subcontinent (Acharya and Sharma, 2013). The recent data shows that over 84% of the total geographical area of Sikkim is under the administrative control of the forest department. Out of which, 82% comprises Reserve Forests (including forests in biosphere reserve, national parks and wildlife sanctuaries) and 2% *Khasmal* forests and *Gaucharan* forests. According to the Forest Survey of India, the total forest cover in Sikkim is 3357 km² which makes up around 47.31 % of total geographical area of the state (FSI, 2015).

Sikkim has a total of eight PAs which covers around 42.5 % of the total geographical area of the state. The protected area network (excluding biosphere reserve) covers 31 % of the total geographical area which is highest in the country and is far above the national average (around 5 %). These protected areas comprise one national park and biosphere reserve, six wildlife sanctuaries and one bird sanctuary. These PAs are now effective in protecting natural heritage of Sikkim. Therefore the other possible reasons of HWC in the context of Sikkim, could be due to the increase in wildlife population and its increasing requirements of resources to sustain these population (Bhutia, K C 2017). This significant increase in wildlife population due to the establishment of protected areas and the resultant conflict, have altered the perception and tolerance of these communities towards wildlife and threaten to erode the local support for conservation by making them hostile towards wildlife, conservation initiatives and staff of protected areas.

This report highlights the ongoing discourse of HWC in four fringe villages of Kitam Bird Sanctuary and Barsey Rhododendron Sanctuary. While collecting data using scientific and participatory approaches, mapping exercises, household interviews, consultations and discussions with all the stakeholders involved to understand the various aspects of the issue and develop community based mitigation strategies. This will allow the concerned forest department to plan mitigation measures more efficiently and help policy makers and planners to understand the hotspots of such conflict sites. The study also aims to contribute on raising awareness and sensitise the communities and other stakeholders on the issue and its management. Overall the project hopes to bring in policy inputs in managing human wildlife conflict in innovative ways.

II. Project sites



Map 01: Map of the study area

Kitam Bird Sanctuary (KBS)

The Kitam Bird Sanctuary located along the southern boundary of Sikkim state. The sanctuary was established in 2005 for protection of wildlife and its environment. The area was a reserved forest before being declared a sanctuary. Kitam bird Sanctuary is located at 88°-20' 27°-06" and 88°-22'- 27°-07" above 320-875 Msl. The total area is 6 km² and the total perimeter is 10 KM. The Sanctuary was declared considering geomorphologic and avi-fauna importance of the area. Though it is the smallest protected area in Sikkim (around 6sq Km), Kitam Bird Sanctuary has its significance as the only protected area in Sikkim in the tropical ecoregion (below 1,200 msl. Another major significance of this sanctuary is a habitat for number of birds and other animals especially those unique for the tropical ecoregion. It is informed that there are 125 species of birds of which 60% are migratory, though this might be a conjecture as no comprehensive survey appears to have been done. The Sanctuary is also included in the Important Bird Area selected by Bird Life International, namely "Lowland forests of South Sikkim (Melli-Baguwa-Kitam, Jorethang-Namchi, Sombarey) Lachungpa *et. al.* 2011.

i. Lower Kitam village

Lower Kitam village is situated at the south-eastern boundary of the Kitam Bird Sanctuary, which comes under the South district of the state of Sikkim. The village is located at N 27°07.229' E 088°21.402' and situated at an altitude of 604 m. The slope of the village is towards the Eastern side. The village is bounded by Kitam Bird Sanctuary on the Western side, Sumbuk Reserve forest on the southern side, Manpur forest on the eastern side and Upper Kitam village on the northern side. The stream namely 'dhara kholcha' flows on the eastern side of the village forming its boundary and Manpur River flows on the southern side of the village also forming its boundary. The village is surrounded by forest mostly comprising of tree species like *Shorea robusta*, *Pinus roxburghii*, *Schima wallichii* and *Duabanga grandiflora*.

The village is situated near the border of the state of Sikkim and West Bengal. The nearest villages are Manpur in the east, Sumbuk in the south, Upper Kitam in the North and Belbotay in the west. The nearest town is the town of Namchi (14 km away). The village has an access through all weather road connectivity.

The village also has one primary school (upto class V). The village is mainly habituated by Hindu population. The most common dialect is Nepali. The main occupation of the community is subsistence agriculture and each household has an average landholding size of 3.94 acres, out of which an average of 0.50 acre of land is being used for agricultural purposes. Other occupations of the villagers are government employee, livestock rearing, labourers and home stays for occasional tourists. The most common livestock reared are cows, goats, poultry and pigs. The most common agricultural crops grown are maize, paddy, pulses, beans, horticultural crops, ginger, millet, turmeric and other vegetables.

ii. Belbotay village

Belbotay (N 088°20.326, E 088°20.326) village is situated at the north-western boundary of Kitam Bird Sanctuary, which comes under the South district of the state of Sikkim. The village is located at an altitude of 571m. The slope of the village is towards the Western side. The village is bounded by Kitam Bird Sanctuary on the Eastern side, Majhitar Reserve forest on the southern side, Majhitar village on the western side and Upper Kitam village on the northern side. River Rangeet flows on the southern side of the village, which acts as a boundary between the state of Sikkim and West Bengal. The village is surrounded by forest mostly comprising of tree species like *Shorea robusta*, *Pinus roxburghii*, *Schima wallichii* and *Duabanga grandiflora*.

The nearest town is the town of Namchi (13 km away). The village doesn't have access to roads and is mostly accessed through footpaths. The village is mainly habituated by Hindu and few Christian populations. The most common dialect used for communication is Nepali.

The main occupation of the people is agriculture and each household has an average landholding size of 3.94 acres, where an average of 0.49 acre of land is used for agricultural purposes. Other occupations of the villagers include labourers for industrial factories, government employee, livestock rearing and daily wage labourers. The most common livestock reared are cows, goats, poultry and pigs. The most common agricultural crops grown are maize, paddy, pulses, beans, horticultural crops, ginger, millet, turmeric and other vegetables.

Few households in the southern part of the village are resided by individuals, who does not own any lands or have any entitlements. But practises traditional agricultural systems of 'Adhay' or 'Kuth' where the agricultural fields are leased to them by the land owners and the yields from land are divided equally among the owner and the farmer. These individuals are mostly inhabitants of the neighbouring state and country of West Bengal and Nepal.

Overall, both these villages surrounding Kitam Bird Sanctuary has a in its population a large share of people economically backward, though a few of them are Scheduled Tribe or Scheduled Caste. The livelihoods of these communities are dependent on agriculture, animal husbandry and agro-based labourers. Other than few employs of government, most of these communities rely on subsidiary professions like small scale business, livestock maintenance, piggery, poultry and construction labourers in most cases.

Barsey Rhododendron Sanctuary (BRS)

The Barsey Rhododendron Sanctuary is located in the south west corner of Singalila range in western Sikkim and is spread over an area of 104 km². It is situated at an altitude of 2200 – 4100 mts and is separated from the state of West Bengal in the south by Rambang river and Nepal on the west. The BRS forms a vital corridor connecting the Kangchendzonga Biosphere Reserves to its north and Singalila National park of West Bengal to its south. BRS also host five diverse forests namely, Subtropical Moist Deciduous Forests (2,200-2,400 m); Wet Temperate Forests (2,400-2,700 m); Moist Temperate Forests (2,700-3,250 m); Subalpine Forests (3,250-4000 m), and Alpine meadows (>4,000 m) (Sharma 2001) which shelters a

wide range of fauna varieties of epiphytic orchids, ferns, mosses and lichens. The sanctuary is also renowned for its pure stands of Rhododendron, which blooms during March and April attracting many nature enthusiasts and tourists; the BRS is also a major trekking destination. Besides BRS is also comes under one of the Important Bird Areas in India.

i. Upper Bhareng Village

Upper Bhareng (N 27°10.237' and 088°05.212' village is situated at the southern boundary of the Barsey Rhododendron Sanctuary, which fall under the West district of the state of Sikkim. The village is located at an altitude of 2374 m. The slope of the village is towards the South. The village is bounded by BRS on the north, Ribdi village on the east, BRS on the west and Lower Bhareng village on the south.

The village is situated near the border of the states of Sikkim and West Bengal. Being a village situated near a Rhododendron Sanctuary. The village is surrounded by the forest mostly comprising Rhododendron species and species like *Castanopsis sp.*, *Cryptomeria japonica*, *Lithocarpus pachyphylla*, *Quercus lineate* etc. The nearest town from the village is Sombaria (25 km away). Most of the village has to roads and are well connected through footpaths. The village also has one government primary school for studies up to class V. The village is chiefly habituated by population of Sherpa community along with some other nepali community. The majority of households follow Buddhism followed by Hindusm and the most common dialect is Nepali.

Agriculture is the main occupation of the community and each household has an average land size of 6.53 acres where agriculture is practised at land size averaging upto 0.81 acres. Other occupations of the villagers comprise of livestock rearing, government employee, daily wage labourers, few tourist guides and home stays for tourists. The most common livestock reared are cows, poultry and pigs. The most common agricultural crops grown are maize, potato, cabbage, pea, carrot, pea, cauliflower and other leafy green vegetables.

ii. Upper Ribdi Village

Upper Ribdi (N 27°10.221' E088°05.896') village is also situated at the southern boundary of the Barsey Rhododendron Sanctuary, which fall under the West district of the state of Sikkim. The village is located at an altitude of 2443 m. The slope of the village is towards the South. The village is bounded by BRS on the north, Okhrey village on the east, Upper Bhareng on the west and Lower Ribdi village on the south.

The village of Upper Ribdi is also situated near the bordering state of West Bengal, which exists after Lower Ribdi village. Being a village situated near a Rhododendron Sanctuary. The village is surrounded by the forest mostly comprising Rhododendron species and species like *Castanopsis sp.*, *Cryptomeria japonica*, *Lithocarpus pachyphylla*, *Quercus lineate* etc. The nearest town from the village is Sombaria (23 km away). Most of the village has access to seasonal motor able roads and most parts of the village is connected through footpaths. The village also has a Government Senior Secondary School for studies up to class XII. The village is chiefly habituated by population of Sherpa community along with some other

nepali community. The majority of households follow Buddhism followed by Hinduism and the most common dialect is Nepali.

Agriculture is the main occupation of the community and each household has an average land size of 4.31 acres where agriculture is practised at lands averaging 0.63 acres. Other occupations of the villagers are livestock rearing, government employee, daily wage labourers, tourist guides and home stays for tourists. The most common livestock reared are cows, poultry and pigs. The most common agricultural crops grown are maize, potato, cabbage, pea, carrot, pea, cauliflower and other leafy green vegetables.

Moreover, all the four villages also get their additional income through government schemes like MGNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme). These villages also have an informal institution named ‘Samaj’, where each household is the member of samaj. The Samaj has an informal governing body. The main function of the Samaj is to support or help any of the household whenever in need. The village also has an EDC (Eco Development Committee) which works along with the state forest department to manage the surrounding forest, suggest physical and financial targets, promote conservation awareness through environmental programmes and improve forest cover via afforestation. Moreover, the EDC acts as a bridge between the states forest department and the community for sustainable development of their surrounding forest.

	Lower Kitam	Belbotay	Upper Bhareng	Upper Ribdi
Gram Panchayat	Kitam – Manpur	Kitam – Manpur	6 - Upper Bhareng	3-Upper Ribdi
Block	Namchi	Namchi	Ribdi-Bhareng	Ribdi-Bhareng
Sub – division	Namchi	Namchi	Sombarey	Sombarey
District	South Sikkim, Namchi	South Sikkim, Namchi	West Sikkim, Geyzing	West Sikkim, Geyzing
Forest Range	Melli	Melli	Sombarey	Sombarey
No. of HH	56	56	47	46
Major religion	Hindu	Hindu & Christian	Buddhist & Hindu	Buddhist & Christian
Altitude	604 m	571 m	2374 m	2443

The detail profile of the study villages

III. Project activities

A. Preliminary inception meetings and consultations

Preliminary and consultation meetings were organised, during the initial period of the project involving key stakeholders in the areas of HWC. These included meetings with relevant officials of the state forest department like DFO's (District Forest Officer) Wildlife of both South and West Districts, concerned RO's (Range Officer), BO's (Block Officer), Panchayat members and Eco Development Committee (EDC) members of the villages from both Barsey Rhododendron Sanctuary (BRS) and Kitam Bird Sanctuary (KBS).

These meetings were focused on discussing various issues of HWC and also to collect more information on HWC from different villages in the fringe area of both the protected areas. This included discussing the various mitigation measures undertaken by the state government in different sites, the compensation mechanism within the state and policies on HWC and to help identify potential study villages among all the villages in the fringes of both PA's. The details of these meeting are provided in Annexure I, II and III

Consultation meetings were organised with the practitioners of two different Non-Governmental Organisations from Sikkim and Darjeeling, namely WWF (Kangchendzonga landscape Office - Sikkim) Gangtok and Darjeeling Ladenla Road Prerna, Darjeeling, West Bengal. These consultations were conducted with practitioners, who have many years of experience working on issues related to HWC for quite a long time in the hills. So efforts were made through these meetings to include their valuable insights on their experiences and lesson learnt while working on conflict mitigation in the region, which would apparently be helpful for the project. Details of these meetings can be found in Annexure IV.

Image 01: *Community consultation at Lower Kitam village*



Image 02: *Community consultation at Upper Ribdi village*



B. Community Consultations

Village level consultations/meeting were organised in each of the study villages, after its identification through consultations with the state forest department officials, local EDC (Eco Development Committee) members and the local communities.

These village level meetings were organised in forms of PRA's (Participatory Rural Appraisals) which aimed to incorporate the knowledge and opinions of the communities to identify some of the key issues of Human Wildlife Conflict in their village like: i) loss of assets ii) different problem animals involved in the conflict iii) identify the tolerance level of the community for each of the problem animals iv) most vulnerable crops/livestock's v) history, trends and present status of the conflict vi) compensation mechanisms and its ambiguity/efficiency vii) different mitigation measures opted by the communities and their effectiveness viii) understand the linkage and coordination between various departments/agencies/sectors and the community to manage conflict.

The meetings were attended by at least a representative from each households of the entire village along with their Panchayat representatives/president and Eco Development Committee members/representatives. It was ensured that all the participants participated equally in the activities and all the information's collected were not biased by individuals or all the information's provided were mutually agreed upon by all the participants.

These information's were collected using various PRA tools like, Timeline method, Listing and preference ranking, Participatory mapping and Likert Scale. We choose to be very consultative and participatory in all our methods during the meetings as without these approaches the information we receive may not be reliable and could not provide us the valuable insight into the perceptions of the community.

The review of all the community consultations/meetings suggests that the negative interaction between the wild animals and the community members within these areas was evident. The ever increase in these conflict according to the communities is due to wildlife favouring policies of the government, which in turn has led to the wild animals to thrive. Some of problem animals which are pertinent over the study areas, identified by these communities were Wild boars, Barking deer's, Macaques, Leopards, Indian hares, Porcupines etc. While animals like Peacock and Himalayan Black bear were only identified as problem animals in specific areas, which is due to the unavailability of these animals in those areas. These animals also tend to damage almost all the crops which were grown on these areas. It also appeared that almost all the mitigation measures adopted by these communities to control the damages seemed to be ineffective, which truly represents their vulnerability to damages and calls for interventions of various institutions regarding this issue. These communities also believes that the current compensation (ex-gratia) mechanism adopted by the government should be reformed and the amount being compensated to be revised, in order to make it more efficient and people centric, which can aid to their current situation.

However, the detailed illustrations of all the consultations/meetings organised in each study villages can be found in Annexure V to VIII

Image 03: PRA at Lower Kitam



Image 04: PRA at Lower Kitam



Image 05: PRA at Belbotay village



Image 06: PRA at Upper Bhareng village



C. HWC monitoring

After a series of consultations/meetings with the local communities and stakeholders, a total of 191 household interviews were conducted in each study villages, covering almost all the households of each village and ensuring all the economic groups, land sizes and family sizes were represented during the household survey. The objective of these interviews was to solicit information such as the socio economic status of each household, issues of HWC currently faced by them with regards to the economic losses suffered by or the amount of crop and livestock loss in a year or a season, knowledge and awareness regarding the compensation scheme of the government, different mitigation measures adapted by them and many other parameters.

A semi-structured and open ended interview was conducted to engage the respondents in conversation through a series of guide questions which were relevant to the communities, which gave the interviewer an opportunity to explore particular theme or response further. These interviews were conducted by educated local individuals of the community, with prior experiences on conducting HH interviews. These individuals were then trained and oriented on how to conduct interviews by the project team.

The examination of these data suggests

- Most of the households residing in these villages were subsistence farmers, followed by few government employees, daily wage labours and tourism service providers.
- Incidents of crop damages are more than livestock lifting or direct encounters with the humans
- The average land holdings of these households are 4.52 acres, out of which an average of 0.52 acres of land are being cultivated or used for agricultural purposes.
- The number of livestock's in each household is 2.01 and an average of 1.12 livestock's has been lifted from each household till date.
- The respondents believe although these incidents of conflicts have been taking for a decade but these incidents have from the past 6.8 years on an average.
- The average tolerance for the % of damage on the total agricultural land is 13%.

Image 07: Household interview being conducted at Upper Ribdi village



Image 08: Household interview being conducted at Belbotay village

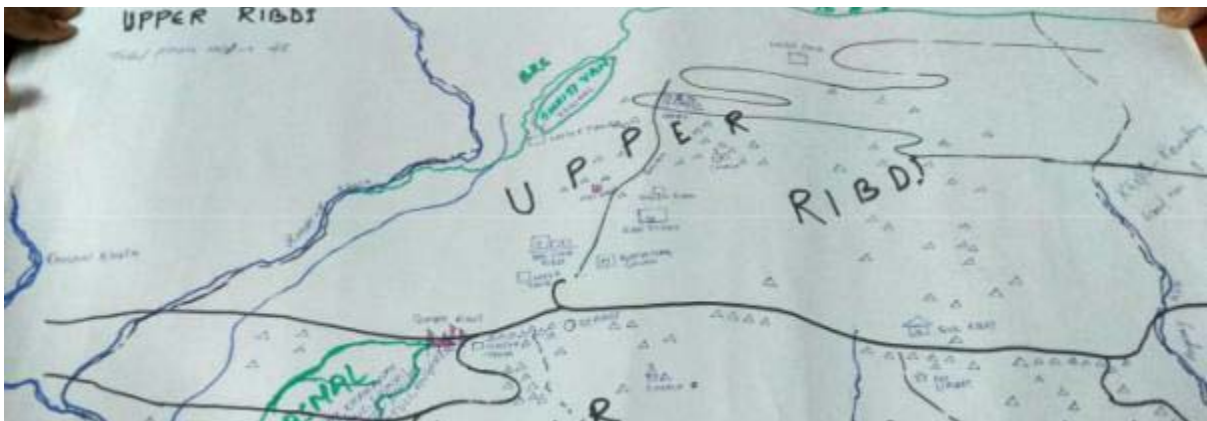


D. Participatory and HWC Mapping

The communities were asked to draw or model the current status of the village and denote the historical condition of the village if possible in the same map/model. However the members of all the villages were able to depict the current status of the village only. These maps were prepared by the participations of almost all the community members present during the PRA/meeting. These maps provide us an idea about the location of each household in the village and its proximity to the nearby forests and up to an extent the current land-use pattern of each village. We were also able to identify the vulnerable households within the villages, as it was clear that the households located in the fringes of the forest were more prone to the incidents of conflict during our previous consultations and meetings.

The study however could not locate the most raided fields and most vulnerable households in terms of incidents as the monthly incident data could not be collected due to some unanticipated problems.

Map 02: Participatory map prepared by the community of Upper Ribdi village



Map 03: Participatory map prepared by the community of Upper Bhareng village



Image 09: Community map being prepared by the community of Upper Bhareng



Image 10: Community map being prepared by the community of Lower Kitam Village



E. General awareness building

i. Awareness programme on Human Wildlife Conflict

Different events were organised through this projects to sensitise and aware the communities. These events specially focused on engaging students as its target audiences. As couple of institutions were already involved in organising similar events occasionally which incorporated farmers, but no programmes were organised in the school level, targeting the children's. So, the project team after consultation with the local school representatives, communities, Panchayat and the forest department decided that similar events should be organised at the school level involving the students. Which, would aware the students and eventually their parents about the current local situations, its impacts and possible viable outcomes and managements.

An interaction programme entitled 'an awareness programme on Human Wildlife Conflict on KBS/BRS' was organised in both the Senior Secondary Schools of Kitam and Ribdi. The programme was attended by a total of 175 participants comprising of the students above class IX and the teachers of the school. A local biodiversity expert was also invited to give a talk about the local biodiversity and its importance along with the talk by Vikram Pradhan regarding the Human Wildlife Conflict. These talks were then followed by interactive sessions, where the students and teachers expressed their opinions and cleared their doubts. The detailed reports of these programmes can be found in the Annexure IX and X.

Image 11: Awareness program organised at Government Senior Secondary School Kitam



Image 12: Awareness program organised at Government Senior Secondary School Kitam



Image 13: Awareness program organised at Government Senior Secondary School Ribdi



ii. Farmers knowledge exchange program

As mentioned in the project activities a farmers knowledge exchange program was organised by the project on the 19th and 20th of February 2018. Where a total of 27 farmers from the villages around KBS and BRS of Sikkim visited a village in the Singalila landscape, Darjeeling, West Bengal to explore and exchange knowledge on Human wildlife conflict issues, mitigation and convergence. A detailed report on the visit can be found in the Annexure XI

The project team however was not able to produce communication products to generate better understanding and knowledge regarding Human wildlife conflict around their villages.

Image 14: *Participants of the Farmers knowledge exchange program*



Image 15: *Participants observing the Bio fence during the farmer's knowledge exchange program*



Image 16: *Participants observing the Bio fence during the farmer's knowledge exchange program*



Image 15: *Participants observing the Bio fence during the farmer's knowledge exchange program*



F. Mitigation strategy planning workshops

i. Community based workshops to plan mitigation strategies

A community based workshop to plan the mitigation strategies to address Human Wildlife Conflict of the study areas was organised in Upper Bhareng and Kitam respectively, which were attended by the local Panchayat members, Eco development communities, local enthusiastic community members and the project team. These workshops were organised with an intention to discuss the different possible solutions, which were suggested by the community during the PRA (Participatory Rural Appraisal). The details of these workshops can be found on the Annexure XII and XIII

Strategies suggested by the communities

Villages of Kitam Bird Sanctuary

- a. Proper fencing of the village boundary (either concrete, wired or chain)
- b. Culling of the wild boar population.
- c. Fully compensate the damage done by the wild animals.
- d. Promote alternate sources of livelihood (like tourism, dairy farming, apiary etc)

Villages of Barsey Rhododendron Sanctuary

- a. Proper fencing of the village boundary (either concrete, wired or chain)
- b. Promote cultivation of Horticultural crops favourable in the region (Strawberry, Blueberry, Apple, Ground apple etc).
- c. Good quality seeds and livestock's should be distributed by the governmental institutions.
- d. Promote alternate sources of livelihood (like tourism, home stays, dairy farming etc)

The project team plans to organise dissemination workshop to circulate the data collected during the course of this project, to the District Forest Officers and other state forest department officials of both Kitam Bird Sanctuary and Barsey Rhododendron Sanctuary and different stakeholders (Panchayats, Block Development Officers, concerned Agriculture/Horticulture departments, local EDCs and NGOs) and community members of the study villages. So, that the different viable mitigation measures developed during the course of this study can help to bring in policy inputs in managing human wildlife conflict in these areas and are ultimately implemented in the concerned villages. The workshop also aims to foster the already pessimistic relationship between the community and the concerned institution and encourage the creation of partnership, diverse stakeholder compliance and collaboration which can strengthen the possibility of resolving the issue of HWC and make the strategy more successful.

The dissemination workshop will be scheduled as soon as the final report is been produced to the contributor of the project Rufford Small Grants, UK and concerned state forest department.

Image 18: *Community mitigation strategy planning workshop at Upper Bhareng village*



Image 18: *Community mitigation strategy planning workshop at Upper Bhareng village*



III. Issues and Challenges

From this case study it was evident that the intense HWC within the region results in regular economic losses to the communities and the situation need to be recognised at the higher level with different viable socially accepted mitigation and management interventions. These communities within the fringes of protected areas are bearing the cost conservation efforts and their voices and difficulties are unattended in these global and national commitments of conservation. With the absence of mega faunas like elephants and tigers, the incidents of direct conflicts are negligible but the presence of innumerable small animals inflicts immense damages creating a composite situation of managing the conflict.

As most of these communities are subsistence farmers with challenging socio economic status, the circumstances becomes more intense as these communities cannot access adaptive measures which generally involves high investments which they cannot afford and the concerned departments and institutions normally plays a traditional role and needs to rise to the occasion and come up with effective schemes and policies. The other challenge would be to bring back the farmers back and engage on agriculture again especially for those who have already given up agriculture and opted to the other sources of livelihoods due to HWC.

The current study lacked the baseline and was limited to study the huge and complex issue of HWC and could not incorporate HWC before and after even though it exists.

IV. Next Steps

The issue of HWC needs to be recognised in the mountain regions at all level. The lack of information and data on HWC can be supplemented by undertaking studies to understand the exact nature and extent of damages and the animals involved, socio economic status of the communities and the impact of conflict their capacity to adapt, population and present status of the problem animals and monitoring of mitigation measures if any.

Innovative measures to manage and mitigate conflicts should be encouraged, which can be widely accepted and emphasis should be given to bio-fences which can easily be implemented and has numerous benefits. Provisions of alternate livelihoods should be explored with market linkages. Revisions of current schemes like Compensation should be done which can alter the perception of peoples experiencing the damages and eventually make them more resilient. Emphasis should also be give to garner local support for conservation and sensitise communities on various ecosystem goods and services received from the forests within the affected sites so that the natural areas around these villages are conserved and there are no retaliatory killings of wildlife.

Cooperation and collaboration of various government and non-governmental institutions and departments should be enhanced to better understand and mange the HWC, which are community centric and empowers the community and involves them as a primary stakeholders.

Annexures

Annexure I: Report on inception meeting and consultation with DFO (District Forest Officer) and RO (Range officer) Kitam Bird Sanctuary (KBS), Wildlife Division South Sikkim. 12th April 2017

Annexure II: Report on inception meeting and consultation with DFO (District Forest Officer) and RO (Range officer) Barsey Rhododendron Sanctuary, Wildlife Division West Sikkim. 19th April 2017

Annexure III: Report on inception meeting with EDC (Eco Development Committee) president, Kitam Bird Sanctuary and representatives of Lakshya Organisation, Kitam 24th April 2017

Annexure IV: A report on the consultation meeting with Sailesh Sharma of Darjeeling Ladenla Road Prerna (DLR Prerna), West Bengal. 02nd May 2017

Annexure V: A Participatory Rural Appraisal (PRA) report of Lower Kitam village – 27th May 2017

Annexure VI: A Participatory Rural Appraisal (PRA) report of Belbotay village – 04th June 2017

Annexure VII: A Participatory Rural Appraisal (PRA) report of Upper Bhareng village – 25th June 2017

Annexure VIII: A Participatory Rural Appraisal (PRA) report of Upper Ribdi – 02nd July 2017

Annexure IX: A report on awareness program on Human Wildlife Conflict at Government Senior Secondary School, Kitam, South Sikkim 16th October 2017

Annexure X: A report on awareness program on Human Wildlife Conflict at Government Senior Secondary School, Ribdi, West Sikkim 17th November 2017

Annexure XI: A Report on Farmers Knowledge Exchange Program – visit by the farmers from Sikkim 19th February – 20th February 2018

Annexure XII: A report on Community based meeting to plan mitigation strategies for the village, Lower Kitam 30th January/2018

Annexure XIII: A report on Community based meeting to plan mitigation strategies for the village, Upper Bhareng 09th February 2018

Annexure I

Report on inception meeting and consultation with DFO (District Forest Officer) and RO (Range officer) Kitam Bird Sanctuary (KBS), Wildlife Division, South Sikkim.

Date: - 12/04/2017

Venue:- Office of the District Forest Officer, Wildlife Division, Namchi South Sikkim

A preliminary inception meeting was held at the office of the DFO (WL), Namchi, South Sikkim. The meeting was attended by DFO (WL) Namchi, Range Officer, Kitam Bird Sanctuary and other staffs from KBS.

The objective of the meeting specially focused on discussing various issues and collect information related to the Human Wildlife Conflict (HWC) from the villages in the fringes of the Kitam Bird Sanctuary. To identify the potential study village from among all the fringe villages of the Sanctuary and to gather contact details of the stakeholders and important individuals, this would be needed during the course of the study.

The details of the discussions are as under

1. The DFO and the forest department were aware of the ongoing conflict in the fringes of KBS and suggested that these kinds of studies would be of great help to them in managing the conflict.
2. The KBS was declared by the state government under the provision of Wildlife (Protection) Act 1972 on 17th June 2006. To check illegal felling and due to its rich biodiversity which support large numbers of bird species.
3. Owing to lots of complaints, applications and demands due to intense Human Wildlife Conflict (HWC), the state forest department has constructed a 1000 meters long solar fence on the Western boundary of the Sanctuary during 2010.
4. It was informed that the payments made to the communities for their damages were ex gratia payments rather than compensations. The funds for these payments are regulated by the central government and the funds provided are meagre comparing to the applications for the damages. So these payments are made after every financial year.
5. As the funds provide by the central government are no sufficient. The DFO plans to include the Sanctuary fund to pay for the damage in coming days.

6. The state forest department has notified rates for the ex gratia payments which includes a list of different crops and livestock.
7. It is made sure that the data collected for the damage is collected by the forest guards only, who then inspects and verifies the damage.
8. The DFO also informed that some of the community members exaggerate their loss, due to which the ex gratia fails to reach the genuine victims.
9. After all the discussions the ideal study village recommended by the officials for project were Lower Kitam and Belbotay village. As these villages were adjacent to Sanctuary and was the closest among all the other villages.
10. As most of the fringe villages fall under a single Eco Development Committee (EDC), so the contact details of the EDC president and members were provided by the department.

Participants

1. Miss Tshering Denka Bhutia, DFO (W) South
2. Mrs Hari Maya Rai, RO (KBS)
3. Vikram Pradhan

Annexure II

Report on inception meeting and consultation with DFO (District Forest Officer) and RO (Range officer) Barsey Rhododendron Sanctuary, Wildlife Division, West Sikkim.

Date: - 19/04/2017

Venue:- Office of the District Forest Officer, Wildlife Division, Geyzing, West Sikkim

A preliminary inception meeting was held at the office of the DFO (WL), Geyzing West Sikkim. The meeting was attended by DFO (WL) West Sikkim, RO, Barsey Rhododendron Sanctuary and other staffs from the department.

The objective of the meeting specially focused on discussing various issues and collect information related to the Human Wildlife Conflict (HWC) from the villages in the fringes of the Barsey Rhododendron Sanctuary. To identify the potential study village from among all the fringe villages of the Sanctuary and to gather contact details of the stakeholders and important individuals, this would be needed during the course of the study.

The details of the discussions are as under

1. The DFO welcome the project as emphasised the importance of this kind of study, which helps to better understand the nature, trend and impacts of the conflict and implement the results to manage the ongoing problem of HWC.
2. Owing to lots of complaints, applications and demands due to intense Human Wildlife Conflict (HWC), the state forest department plans to provide a 1000 meters long barbed wire fence on the northern boundaries of the Upper Ribdi village.
3. The officials also stressed the importance of imminent viable solutions for managing the conflicts around the Protected Areas of the state. As the communities are being increasingly toward the staffs of the department and wild-animals day by day.
4. The payments made to the communities for their damages were ex gratia payments rather than compensations. The funds for these payments are regulated by the central government and the funds provided are meagre comparing to the applications for the damages. So these payments are made after every financial year.
5. The importance revising the current notified rates for the damages was also suggested by the officials as these rates are rarely match the cost of the damage beard by the communities.
6. The potential study village suggested by the officials were Upper Bhareng and Upper Ribdi village. As these villages were adjacent to Sanctuary and was the closest among all the other villages and lots of incidents are reported from these villages.
7. The contact details of all the important personals were collected at the end of the meeting which would be required during the course of the study.

Participants

1. Mr Tamang DFO (W) West Sikkim
2. Mr Keshav Sharma RO (BRS)
3. Mrs Urmila Subba RO (BRS)
4. Vikram Pradhan

Annexure III

Report on inception meeting with EDC (Eco Development Committee) president, Kitam Bird Sanctuary and representatives of Lakshya Organisation, Kitam

Date: - 24/04/2017

Venue: - Kitam Bazar, South Sikkim

After the meeting with District Forest Officer (Wildlife Division) Namchi, South Sikkim and Range Office, Kitam Bird Sanctuary. An inception meeting was organised with the member of Eco Development Committee, KBS and representatives of Lakshya Organisation of Kitam, South Sikkim.

Lakshya organisation has been working actively in and around KBS, promoting livelihoods, bio-diversity conservation and rehabilitation of birds and wildlife of KBS which were lost during forest fires.

The objective of this meeting was to discuss various issues and collect information related to Human Wildlife Conflict (HWC) in and around KBS and to finalise the study village for the project.

The details of the meeting are as under

1. Brisk increase in population of wildlife and the sheer small size of the Sanctuary were the important drivers in increasing incidents of conflict according to the EDC president.
2. However, Mr. Kawshik also believed the increase in conflicts was also due to disturbance in the natural corridor of the wild animals, owing to the establishment of different developmental projects around the Sanctuary.
3. List of different problem animals and vulnerable crops were made and discussed.
4. The intensity of conflict has also altered the livelihood of the communities around the PA as most of them have given up practicing agriculture and opt other sources of livelihoods.
5. The rise in the incidents has also altered perception of the communities towards the animals and forest department and insists culling of over abundant species.
6. The solar fence installed by the forest department was also not very efficient due to the cost of its maintenance and its small length.

7. However, the EDC along with the forest department planted 2-3 hectares of crops inside the Sanctuary in the previous year. This according to them has been proven effective.
8. Mr. Kawshik suggested plantation of different fruit bearing trees inside the Sanctuary to lower the incidents of the conflict.
9. Two villages from the fringes of KBS, which were Lower Kitam and Belbotay village. Due to its proximity and large number of incidents.

After the meeting preliminary visits to both the project villages by the project team along with Mr. Kawshik and EDC president was conducted where general information regarding the villages were collected. The project team also visited some of the households and interacted with the communities.

Participants

1. Mr D B Pradhan (EDC) President KBS
2. Mr Roshan Kawshik (Lakshaya) Kitam
3. Mr Shyam Subba (Lakshya) Kitam
4. Mr Yogesh Rai (Lakshaya) Kitam
5. Vikram Pradhan (ATREE) Gangtok

Annexure IV

A report on the consultation meeting with Sailesh Sharma of Darjeeling Ladenla Road Prerna (DLR Prerna), West Bengal.

Date: - 02/05/2017

Venue: - DLR Prerna Office, Darjeeling.

A consultation meeting was organised with Sailesh Sharma of Darjeeling Ladenla Road Prerna, Darjeeling on 02nd May 2017 at DLR Prerna office, Darjeeling. DLR Prerna has been working extensively on the field of HWC (Human Wildlife Conflict) in the region of Darjeeling for a long time and encompasses vast experience on the field of HWC from the landscape.

This meeting was conducted to have an understanding on the experience and lesson learnt by DLR Prerna while working on HWC mitigation in the region over the years. This meeting was also aimed to integrate implications, suggested by Mr. Sailesh which would be helpful for the project.

The details of the discussion are as under.

1. Preparing of HWC maps along with members of the community is very important as it gives us a good idea about the nature, trend of the conflict and vulnerable locations in the village.
2. It is better to concentrate on the fringes of the village and then continue the study throughout the village, as it helps to understand the better in a particular village.
3. It is very difficult to convince the communities about different mitigation measures. So, one should always consult with the communities while designing mitigation measures or design measures keeping in mind the local acceptability and its viability in local conditions.
4. In their experience the Bio-fence takes at least three to four years to mitigate conflicts, depending on the time and the type of plant species used for fencing.
5. The whole village cannot be fenced by Bio-fence in a single go. The fence should be done starting from the most vulnerable areas, slowly covering the whole village.
6. He also found the incorporation of plant like tea bush very significant, due its characteristic of strong hedge and economic values which the leaves posses.
7. He also suggests liking mitigation activities to different governmental schemes like MGNREGS.
8. The DLR Prerna team also suggest on designing portable chicken coop in areas where poultry depredation is high by the raptors.

Participants

1. Sailesh Sharma, DLR Prerna, Darjeeling
2. Vikram Pradhan, ATREE, Gangtok

Annexure V

A Participatory Rural Appraisal (PRA) report of Lower Kitam village – 27th May 2017

PRA was conducted by Mr. Vikram Pradhan, Ms. Poonam Rai, Mr. Tilak Bdr Bardewa and Mr. Shyam Subba on 27th May 2017. The objective of conducting this PRA was to collect data about villagers perceptions regarding the forest ecosystem disservices (Human Wildlife Conflict); its contribution on their life, trends of HWC and probable drivers, their cause and effect and apparent solutions, problem involving animals, loopholes on current compensation mechanism and different mitigation measures practiced by the community and its effectiveness. Furthermore, the PRA was conducted to validate the community's perception on Human Wildlife Conflict.

Firstly, an in-depth discussion with EDC President, Panchayat and some households was conducted to have a better understanding of HWC and its role on their life. The community's perception was obtained by different PRA exercises. These exercises were conducted to elicit in-depth knowledge of nature, trend and history of HWC in the village and its underlying drivers, problems and its possible solutions.

A brief report on the PRA conducted below.

i. NTFP's and their rank

The villagers have access to different types of NTFP's which are used for different purposes that support their livelihood. These NTFP's are obtained from the nearby forest or their private forest. The community were then asked to list and rank (which would give us an idea about their preferences) all the NTFP's they extract. The community ranked water as most important, which they use for their daily household activity, livestock rearing and irrigation. While decorative plants were ranked lowest. A detailed list of NTFP's and their ranks are listed in the table below.

List of NTFP's and their ranks.

NTFP's	Rank
Water	1
Fodder	2
Fuel wood	3
House building materials (bamboo, stumps, rocks etc)	4
Litter	5
Edible vegetables	6
Medicinal Plants	7
Decorative plants	8

ii. Agricultural crops and their ranks

Since it was clear in the earlier discussions with the Panchayats, EDC members and some households, that there is intense HWC in the village. So, the villagers were then asked to list different agricultural crops they grow and rank them in terms of their vulnerability to the

damage by wild animals. However, the community informed that only few households now cultivate ‘Paddy’, which was once cultivated in large at the region due to intense HWC. The villagers ranked maize followed by paddy, pulses, fruits, vegetables and tubers (yams) as the crops most vulnerable to crop raiding.

The community also suggested that the intensity of HWC has also made them alter their choice of crop. They now cultivate crops like Turmeric and Ginger, which earlier were not cultivated and are less damaged. The villagers also informed that the scale of cultivating these crops has been significantly reduced due to Crop raiding. Now, they mostly depend on market for their food source, which was not the case few decades back.

Agricultural crops and their ranks in terms of their vulnerability to the damage

Agricultural crops	Ranks in terms of vulnerability
Maize	1
Paddy	2
Pulses	3
Fruits	4
Vegetables	5
Tubers	6

iii. Problem animals; their ranks in terms of threat, their status and tolerance level.

Like, agricultural crops, the community were also asked to list different problem animals involved in conflict and rank them in terms of their threats. These ranks were obtained by ‘Pair-wise ranking’ method, which is a tool to set priorities between different options available. Each listed animals were directly compared with other animals, with ranking from highest (most damaging) to lowest (least damaging). The community ranked wild boar highest, followed by peacock, birds (other than Peacock) and other animals. The community also ranked the livestock raiders the least, which is due to the fact, that there are very negligible cases of livestock lifting in the village. So, they perceived very less threat from the livestock lifters. The reason for ranking wild boar highest was due to the intensity of damage and its nature of damaging in herd. The other reason for ranking wild boar higher is its destructive nature. According to villagers, while other animals only raid the fruits, wild boar destructs the whole crops which cannot even be used as fodder for livestock. Detail of pair-wise ranking can be found in table 4.

Pair wise ranking of different problem animals.

	Wild boar	Barking deer	Macaque	Peacock	Indian Hare	Porcupine	Jungle Rat	Squirrel	Leopard	Birds	Civit cat	Fox/Marten	Rank
Wild boar	X	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	1
Barking deer		X	Macaque	Peacock	Indian Hare	Barking deer	Barking deer	Barking deer	Barking deer	Birds	Barking deer	Barking deer	5
Macaque			X	Peacock	Macaque	Macaque	Macaque	Macaque	Macaque	Birds	Macaque	Macaque	3
Peacock				X	Peacock	Peacock	Peacock	Peacock	Peacock	Peacock	Peacock	Peacock	2
Indian Hare					X	Indian Hare	Indian Hare	Indian Hare	Indian Hare	Birds	Indian Hare	Indian Hare	4
Porcupine						X	Porcupine	Porcupine	Porcupine	Birds	Porcupine	Porcupine	6
Jungle Rat							X	Jungle Rat	Jungle Rat	Birds	Jungle Rat	Jungle Rat	7
Squirrel								X	Leopard	Birds	Civit cat	Fox/Marten	10
Leopard									X	Birds	Leopard	Leopard	8
Birds										X	Birds	Birds	2
Civit cat											X	Civit cat	9
Fox/Marten												X	9

Similarly, the villagers were asked to identify the ‘Tolerance level’ for each animal listed earlier and indicate their population status according to them. These tolerance levels identified using ‘Likert scale’. A bipolar scaling method, used to measure either positive or negative response, which contains equal number of positive and negative position. The level of tolerance were categorised in terms of threats (crop raiding, livestock lifting, human attack or fear of presence of wild animal in their surrounding) perceived by the community from particular animal. The community were asked to categorise animals as

‘Intolerant animals’- animals from which they perceive maximum threat, which may force them to alter their livelihood, migrate, reduction in quantity of land cultivation/livestock holding.

‘Moderately tolerant animals’ – Animals they do not perceive much threat, but the increase in threats would make the community intolerant towards the animal.

‘Tolerant animals’ – The community does not bother about the threats perceived by them from that particular animal.

The community categorised Wild boar, Peacock, birds other than Peacock like Jungle fowl, Kalij pheasant, Dove, Thrust etc. and Leopard as Intolerant animals. Community were

moderately tolerant to animals like Macaque, Indian hare, Barking deer and Fox/Marten/Civit cats and, animals like Squirrel and porcupine were categorised as tolerant animals.

Tolerance level for different animals

Problem animals	Tolerance level
Wild boar	Intolerant
Peacock	Intolerant
Birds (other than Peacock)	Intolerant
Macaque	Moderately tolerant
Indian hare	Moderately tolerant
Barking deer	Moderately tolerant
Porcupine	Tolerant
Jungle rat	Moderately tolerant
Leopard	Intolerant
Fox/Marten/Civit	Moderately tolerant
Squirrel	Tolerant

The community stated that they can tolerate 25% damage to the total agriculture crop grown.

iv. Mitigation measures and its effectiveness

The communities were also asked to list the different mitigation measures used by them to guard their crops and rank them according to their effectiveness. They ranked fencing around their agriculture field to be the most efficient measure, followed by guarding their crops during night from watch tower, using jerry can and rope to make sound and banging tin and chasing away animals. However, placing scare crow and panidheki (locally engineered tool which makes sound at an fixed interval from the flow of water) were ranked the least.

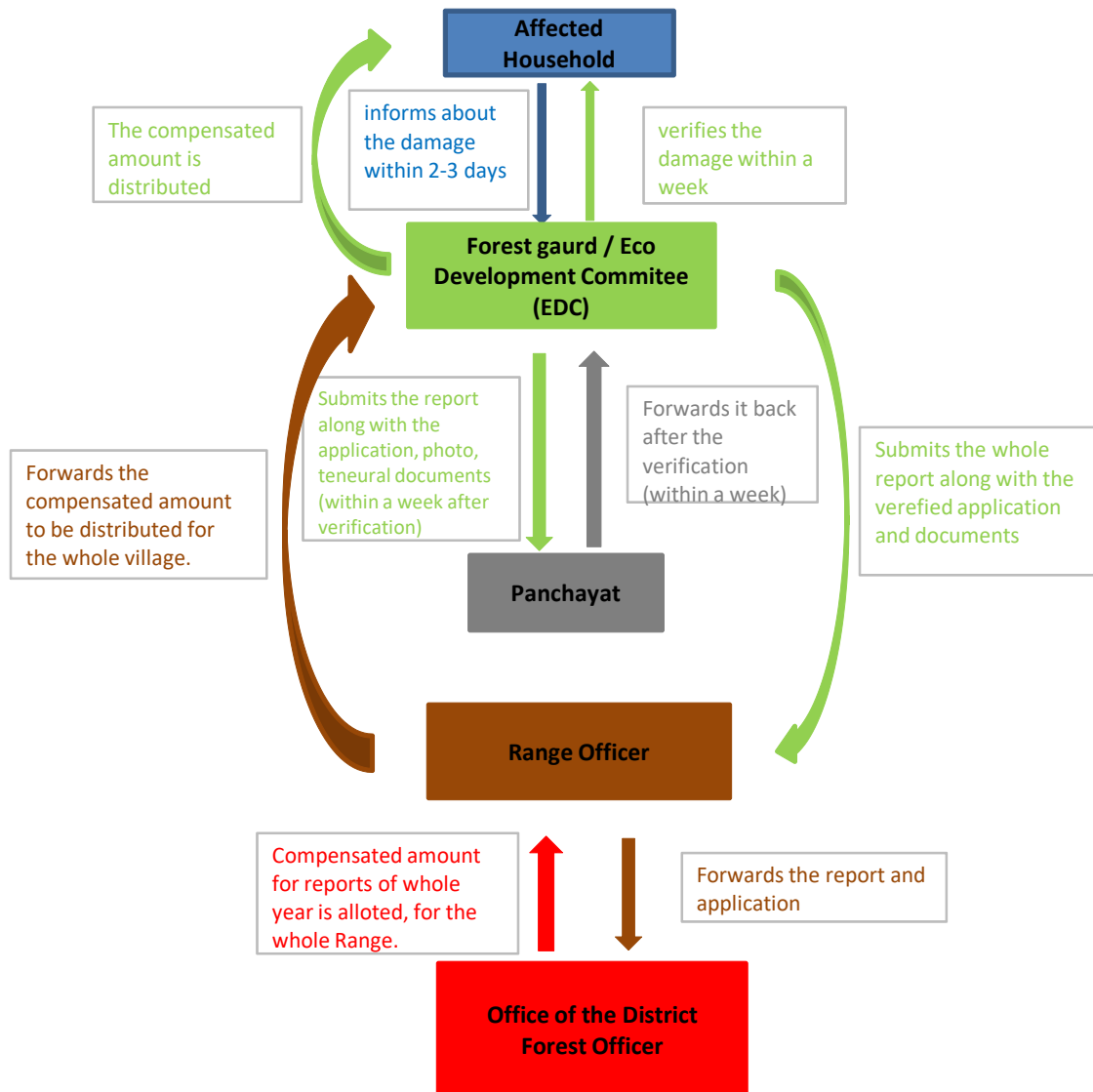
v. Temporal pattern of change in HWC and their drivers of change

People of lower Kitam have been facing the damage from wild animals since the past. But according to them the damage has been intensified from few decades back only. Before setting up of the Bird Sanctuary, there was no major restriction on human activities and licensed hunting of problem animals was practised after getting permission from government officials. People perceive different drivers like ban on hunting, grazing, less human activities in the forest and different rules and regulations favouring the protection of wildlife have helped the population to thrive in their surrounding, which has led to the increase in the intensity of conflict. However, they also believe that the control on forest fires which were frequent in early days, mushrooming of different industries and development projects in their surrounding has wrecked the once pristine corridor of the wildlife and absence of top predator in the forest has also played an important role in intensifying HWC in their region.

vi. Compensation scheme and its effectiveness

The community believes some strong reforms should be implemented on the current compensation mechanism to make it more efficient. They believe the amount being

compensated is meagrely enough considering their damages and the time taken to be compensated is very long after all the bureaucratic procedures they go through to apply for it.



Flow chart of compensation mechanism along with its timeline.

When asked to draw a flow chart along with its timeline to make us understand about this complex compensation mechanism, the community could give us a clearer idea about the time which their application takes to reach to the panchayats after which they had no idea.

The community also suggested there should be some changes in order to make the current compensation scheme more efficient, namely:

- The verification damage should be done immediately.
- Compensation of the damage should be done within a month.
- At least 50% of the total damage should be compensated.
- Villages in the fringes of the PA should get more compensation, than other villages, as they are more prone to damage.

vii. Impacts of HWC and its possible solutions

The villagers suggested the HWC has definitely a huge impact on their livelihood as almost all of them depend on agriculture as their main source of income. The intense HWC over the years have made played a huge role in monetary loss, which in turn has led to giving up of agriculture as their livelihood and opt for other sources of income. They also believe that the monetary loss has also restricted them to provide better education for their children. They highlighted that practicing agriculture nowadays is very expensive, due to the ever increasing cost of labour, seeds and manure, which cost them a lot and crop raiding also leads to the loss on their investments. Since most of the households nowadays have stopped practicing growing crops, there are lots of fields which are left barren.

When asked about different possible solutions which they think could mitigate the ongoing conflict, they emphasised four different solutions, namely:

- a. Proper fencing of the village boundary (either concrete, wired or chain)
- b. Culling of the wild boar population.
- c. Fully compensate the damage done by the wild animals.
- d. Promote alternate sources of livelihood (like tourism, dairy farming, apiary etc)

Participants

1. Shyam Subba
2. Kamal Pradhan
3. Tara Psd Sharama
4. Dak Man Pradhan
5. Shiva Kr Chettri
6. Kamal Kr Pradhan
7. Purna Psd Pradhan
8. Bina Pradhan
9. Subhash Pradhan
10. Rup Bdr Pradhan
11. K S Chettri
12. R B Pradhan
13. Ash Bir Chettri
14. Dal Bdr Pradhan
15. Bal Krishna Sharma
16. Goma Kri Pradhan
17. Santa Maya Subba
18. K B Douban
19. Tilak Pradhan
20. Ratna Bdr hettri
21. Liladhar Sharma
22. Dil Bdr Pradhan
23. Savitri Chettri
24. D B Pradhan
25. Laximi Pradhan
26. Madan Pradhan
27. Mani Kr Pradhan
28. Ganga Pd Pradhan
29. Krishna Pradhan
30. Chandra Chettri
31. Tika Maya Pradhan
32. K B Chettri
33. Tika Maya Pradhan
34. Kusum Pradhan
35. Satyanjali hettri
36. B B Pradhan
37. Nar Bdr Chettri
38. Dil Bdr Pradhan
39. Gyan Bdr Pradhan
40. Nar Bdr Subba
41. Nabin
42. S K
43. Binala Pradhan
44. Nirmaya Pradhan
45. Purna Pradhan
46. Vikram Pradhan
47. Tilak Bdr Bardewa
48. Poonam Rai

Annexure VI

A Participatory Rural Appraisal (PRA) report of Belbotay village – 04th June 2017

A PRA was conducted by Mr. Vikram Pradhan, Mr Rahul Pradhan and Mr. Shyam Subba on 04th June 2017. The objective of conducting this PRA was to collect data about villagers perceptions regarding the forest ecosystem disservices (Human Wildlife Conflict); its contribution on their life, trends of HWC and probable drivers, their cause and effect and apparent solutions, problem involving animals, loopholes on current compensation mechanism and different mitigation measures practiced by the community and its effectiveness. Furthermore, the PRA was conducted to validate the community's perception on Human Wildlife Conflict.

Firstly, an in-depth discussion with EDC President, Panchayat and some households was conducted to have a better understanding of HWC and its role on their life. The community's perception was obtained by different PRA exercises. These exercises were conducted to elicit in-depth knowledge of nature, trend and history of HWC in the village and its underlying drivers, problems and its possible solutions.

A brief report on the PRA conducted are below.

i. NTFP's and their rank

The villagers have access to different types of NTFP's which are used for different purposes that support their livelihood. These NTFP's are obtained from the nearby forest or their private forest. The community were then asked to list and rank (which would give us an idea about their preferences) all the NTFP's they extract. The community ranked water as most important, which they use for their daily household activity, livestock rearing and irrigation. While decorative plants were ranked lowest. A detailed list of NTFP's and their ranks are listed in the table below.

List of NTFP's and their ranks.

NTFP's (Non Timber Forest Products)	Rank
Water	1
Fuelwood	2
Fodder	3
Bamboo	4
Medicinal Plants	5
Edible vegetables	6
Stumps	7
Decorative plants	8

ii. Agricultural crops and their ranks

Since it was clear in the earlier discussions with the key informants (Panchayats, EDC members and some households), that there is intense HWC in the village. So, the villagers were then asked to list different agricultural crops they grow and rank them in terms of their

vulnerability to the damage by wild animals. However, the community informed that only few households now cultivate ‘Paddy’, which was once cultivated in large at the region due to intense HWC. The villagers ranked maize followed by paddy, pulses, vegetables and tubers (yams) as the crops most vulnerable to crop raiding.

The community also suggested that the intensity of HWC has also made them alter their choice of crop. They now cultivate crops like Turmeric and Ginger, which earlier were not cultivated and are less damaged. The villagers also informed that the scale of cultivating these crops has been significantly reduced due to Crop raiding. Now, they mostly depend on market for their food source, which was not the case few decades back.

List of agricultural crops and their ranks in terms of their vulnerability to damage.

Agricultural crops	Ranks
Maize	1
Paddy	2
Pulses	3
Vegetables	4
Tubers	5
Fruits	6
Tomato	7
Chilly	8
Millet	9
Ginger	10
Turmeric	11

iii. Problem animals; their ranks in terms of threat, their status and tolerance level.

Like, agricultural crops, the community were also asked to list different problem animals involved in conflict and rank them in terms of their threats. These ranks were obtained by ‘Pair-wise ranking’ method, which is a tool used to set priorities between different options available. Each listed animals were directly compared with other animals, with ranking from highest (most damaging) to lowest (least damaging). The community also informed that, their crops are being damaged by the Giant African snails, and is a significant cause in pest issue in the village, since couple of years. The villagers perceive that their crops are equally vulnerable to the damage from the snail, like crop damage from the wild animals.

The community ranked Wild Boar highest, followed by Giant African snail, Macaque, Peacock and other animals. The community also ranked the livestock raiders the least, which is due to the fact, that there are very negligible cases of livestock lifting in the village. So, they perceived very less threat from the livestock lifters. The reason for ranking wild boar highest was due to the intensity of damage and its nature of damaging in herd. The other reason for ranking wild boar higher is its destructive nature. According to villagers, while other animals only raid the fruits/twigs/pods, while wild boar destructs the whole crops which cannot even be used as fodder for livestock. Details of pair-wise ranking can be found below.

Pair wise ranking of different problem animals.

	Wild boar	Barking deer	Peacock	Indian hare	Porcupine	Giant african snail	Macaque	Leopard	Fox	Jungle fowl	Marten	Rat	Squirrel	Rank
Wild boar	x	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	1
Barking deer		x	Peacock	Barking deer	Porcupine	Giant african snail	Macaque	Barking deer	Barking deer	Barking deer	Barking deer	Barking deer	Barking deer	5
Peacock			x	Peacock	Peacock	Giant african snail	Macaque	Peacock	Peacock	Peacock	Peacock	Peacock	Peacock	4
Indian hare				x	Indian hare	Giant african snail	Macaque	Indian hare	Indian hare	Indian hare	Indian hare	Indian hare	Indian hare	5
Porcupine					x	Giant african snail	Macaque	Porcupine	Porcupine	Porcupine	Porcupine	Porcupine	Porcupine	5
Giant african snail						x	Giant african snail	Giant african snail	Giant african snail	Giant african snail	Giant african snail	Giant african snail	Giant african snail	2
Macaque							x	Macaque	Macaque	Macaque	Macaque	Macaque	Macaque	3
Leopard								x	Leopard	Leopard	Leopard	Leopard	Leopard	6
Fox									x	Fox	Fox	Fox	Fox	7
Jungle fowl										x	Marten	Rat	Squirrel	11
Marten											x	Marten	Marten	8
Rat												x	Squirrel	10
Squirrel													x	9

Similarly, the villagers were asked to identify the ‘Tolerance level’ for each animal listed earlier and indicate their population status according to them. These tolerance levels identified using ‘Likert scale’. A bipolar scaling method, used to measure either positive or negative response, which contains equal number of positive and negative position. The level of tolerance were categorised in terms of threats (crop raiding, livestock lifting, human attack

or fear of presence of wild animal in their surrounding) perceived by the community from particular animal.

The community were asked to categorise animals as

‘Intolerant animals’- animals from which they perceive maximum threat, which may force them to alter their livelihood, migrate, reduction in quantity of land cultivation/livestock holding.

‘Moderately tolerant animals’ – Animals they do not perceive much threat, but the increase in threats would make the community intolerant towards the animal.

‘Tolerant animals’ – The community does not bother about the threats perceived by them from that particular animal.

The community categorised Wild boar, Giant African snail, Indian hare, Macaque and Leopard as the Intolerant animals. Community were moderately tolerant to animals like Fox, Marten and Jungle rat. While, animals like Squirrel and porcupine were categorised as tolerant animals.

Tolerance level for different animals

Problem animals	Tolerance level
Wild boar	Intolerant
Barking deer	Tolerant
Peacock	Tolerant
Indian hare	Intolerant
Porcupine	Tolerant
Giant african snail	Intolerant
Macaque	Intolerant
Leopard	Intolerant
Fox	Mid-tolerant
Jungle fowl	Tolerant
Marten	Mid-tolerant
Jungle rat	Mid-tolerant
Squirrel	Tolerant

The community stated that they can tolerate 25% damage to the total agriculture crop grown.

iv. Mitigation measures and its effectiveness

The communities were also asked to list the different mitigation measures used by them to guard their crops and rank them according to their effectiveness. They ranked guarding their crops during night from watch tower, followed by placing pani dheki (locally engineered tool which makes sound at a fixed interval from the flow of water) and fencing along the boundary of agriculture field to be the most efficient measures. While,

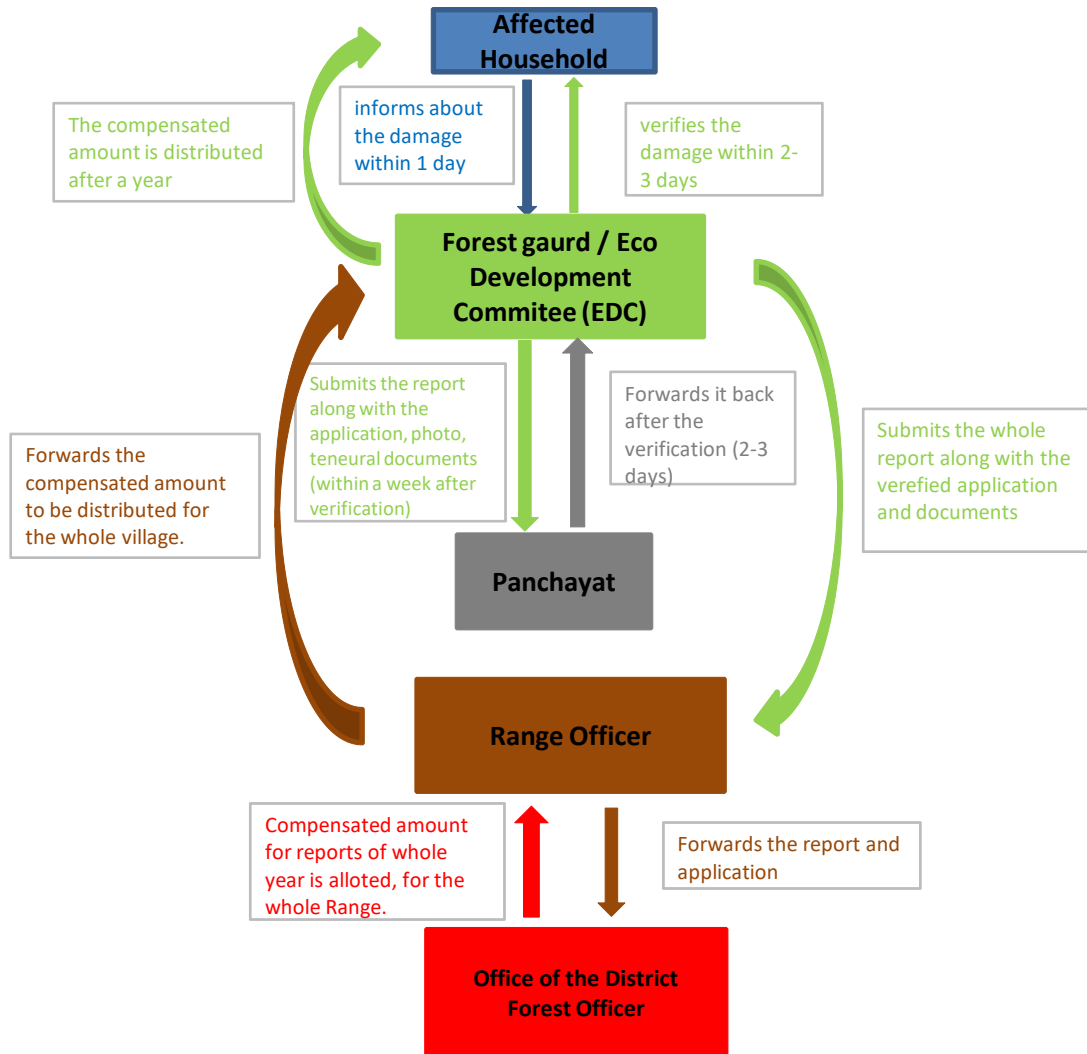
they believe other methods like, placing scare crow, banging tins and chasing away the animals were the least effective methods.

v. Temporal pattern of change in HWC and their drivers of change

People of Belbotay village have been facing the damage from wild animals since the past. But according to them the damage has been intensified from few decades back only. Before setting up of the Bird Sanctuary, there was no major restriction on human activities and licensed hunting of problem animals was practised after getting permission from government officials. People perceive different drivers like ban on hunting, less human activities in the forest and different rules and regulations favouring the protection of wildlife have helped the population to thrive in their surrounding, which has led to the increase in the intensity of conflict. However, they also believe that the control on forest fires which were frequent in early days has also played an important role in intensifying HWC in their region.

vi. Compensation scheme and its effectiveness

The community believes some strong reforms should be implemented on the current compensation mechanism to make it more efficient. They believe the amount being compensated is meagrely enough considering their damages and the time taken to be compensated is very long after all the bureaucratic procedures they go through to apply for it.



The flow chart of compensation scheme along with the timeline.

When asked to draw a flow chart along with its timeline to make us understand about this complex compensation mechanism, the community could give us a clearer idea about the time which their application takes to reach to the panchayats after which they had no idea.

vii. Impacts of HWC and its possible solutions

The villagers suggested the HWC has definitely a huge impact on their livelihood as almost all of them depend on agriculture as their main source of income. The intense HWC over the years have made played a huge role in monetary loss, which in turn has led to giving up of agriculture as their livelihood and opt for other sources of income and migrating to other places for a better living. They also believe that the monetary loss has also restricted them to provide better education for their children. They also highlighted that they are unable to secure their food and their dependence on market for food, has increased which in-turn has

played a role in degradation of their health. They also stressed that the high intensity HWC has also led to the mushrooming of barren agricultural lands in their village.

When asked about different possible solutions which they think could mitigate the ongoing conflict, they emphasised four different solutions, namely:

- j. Proper fencing of the village boundary (either concrete, wired or chain)
- k. Permission to kill the wild animals which enters their fields.
- l. Fully compensate the damage done by the wild animals.
- m. Promote alternate sources of livelihood (dairy farming, apiary, introduction of other suitable crop etc)

List of Participants

- | | |
|----------------------------|---------------------------|
| 1. Umesh Nepal | 27. Kumar Bhujel |
| 2. Prem Lal Chettri | 28. Ashok Kumar Pradhan |
| 3. Shyam Subba | 29. Chandra Kala Chettri |
| 4. Anup Bhujel | 30. Binita Chettri |
| 5. Mani Kumar Pradhan | 31. Kumar Chettri |
| 6. Mani Raj Bhujel | 32. Damabar Maya Bhujel |
| 7. Rahul Pradhan | 33. Anup Bhujel |
| 8. Kharga Bahdur Nepal | 34. Sujata Subba |
| 9. Anjana Bhujel | 35. Lalita Subba |
| 10. Dak Man Pradhan | 36. Smita Rai |
| 11. Kamala Bhujel | 37. Narmaya Bhujel |
| 12. Nirmala Subba | 38. Padma Kumari Kami |
| 13. Roma Subba | 39. Bimala Pradhan |
| 14. Khus Maya Bhujel | 40. Rupa Subba |
| 15. Lila Chettri | 41. Santosh Kumar Pradhan |
| 16. Kumari Bhujel | 42. Kumar Chettri |
| 17. Bhoj Raj Bhujel | 43. Vikram Pradhan |
| 18. Jui Bahadur Bhujel | 44. Ganga Prashad Bhujel |
| 19. Binod Nepal | 45. Rupa Bhujel |
| 20. Bhawani Bhujel | 46. Seema Devi Pradhan |
| 21. Barun Pradhan | 47. Sugam Pradhan |
| 22. Krishana Kumari Bhujel | 48. Venayak Chettri |
| 23. Budhi Maya Chettri | 49. Suju Chettri |
| 24. Damber Singh Bhujel | 50. Bipana Sharma |
| 25. Subash Pradhan | 51. Manita Bhujel |
| 26. Kamala Pradhan | |

Annexure VII

A Participatory Rural Appraisal (PRA) report of Upper Bhareng village – 25th June 2017

A PRA was conducted by Mr. Vikram Pradhan, Mr. Tilak Bdr Bardewa on 25th June 2017. The objective of conducting this PRA was to collect data about villagers perceptions regarding the forest ecosystem disservices (Human Wildlife Conflict); its contribution on their life, trends of HWC and probable drivers, their cause and effect and apparent solutions, problem involving animals, loopholes on current compensation mechanism and different mitigation measures practiced by the community and its effectiveness. Furthermore, the PRA was conducted to validate the community's perception on Human Wildlife Conflict.

Firstly, an in depth discussion with EDC President, Panchayat members and some households was conducted to have a better understanding of HWC and its role on their life. The community's perception was obtained by different PRA exercises. These exercises were conducted to elicit in-depth knowledge of nature, trend and history of HWC in the village and its underlying drivers, problems and its possible solutions.

A report on the PRA conducted is provided below.

i. NTFP's and their rank

The villagers have access to different types of NTFP's which are used for different purposes that support their livelihood. These NTFP's are obtained from the nearby forest or their private forest. The community were then asked to list and rank (which would give us an idea about their preferences) all the NTFP's they extract. The community ranked water as most important, which they use for their daily household activity, livestock rearing and irrigation, followed by fodder for their livestock's, fuel wood and litter manure and cattle shed. While wild edible vegetables were ranked lowest. A detailed list of NTFP's and their ranks are listed in the table below.

List of NTFP's and their ranks.

NTFP's	Rank
Water	1
Fodder	2
Fuel wood	3
Litter	4
Edible vegetables	5

ii. Agricultural crops and their ranks

Since it was clear in the earlier discussions with the Panchayats members, EDC members and some households, that there is intense HWC in the village. So, the villagers were then asked to list different agricultural crops they grow and rank them in terms of their vulnerability to the damage by wild animals. However, the community also suggested that the intensity of

HWC has also made them reduce the scale of cultivation of crops and that they now mostly depend on market for their food source, which was not the case a decade back. The villagers ranked potato as the most vulnerable crop followed by crops like maize, radish, pea, cabbage, carrot, cauliflower and broccoli.

List of agricultural crops and their ranks in terms of their vulnerability to damage

Agricultural crops	Ranks
Potato	1
Maize	2
Radish	3
Pea	4
Cabbage	5
Carrot	6
Cauliflower/Broccoli	7

iii. Problem animals; their ranks in terms of threat, their status and tolerance level.

Like, agricultural crops, the community were also asked to list different problem animals involved in conflict and rank them in terms of their threats. These ranks were obtained by ‘Pair-wise ranking’ method, which is a tool to set priorities between different options available. Each listed animals were directly compared with other animals, with ranking from highest (most damaging) to lowest (least damaging).

The community ranked wild boar highest, followed by leopard, macaque, porcupine, barking deer, kalij pheasant and other animals. The community also listed and ranked only two animals, which is due to the fact that there are very negligible cases of livestock lifting in the village. So, they perceived very less threat from the livestock lifters. However, they rank Leopard second highest, as they fear attack on them and its presence. The reason for ranking wild boar highest was due to the intensity of damage and its nature of damaging in herd. The other reason for ranking wild boar higher is its destructive nature. According to villagers, while other animals only raid the fruits, wild boar destructs the whole crops which cannot even be used as fodder for livestock. When asked about the population status of all the listed animals, they stated the population of all the animals to be increasing. Details of pair-wise rankings can be found below

	Wild boar	Porcupine	Barking deer	Bear	Kalij	Dove	Macaque	Marten	Leopard	Rank
Wild boar	x	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	Wild boar	1
Porcupine		x	Porcupine	Bear	Porcupine	Porcupine	Macaque	Porcupine	Leopard	4
Barking deer			x	Bear	Barking deer	Barking deer	Macaque	Barking deer	Barking deer	4

Bear				x	Bear	Bear	Bear	Bear	Leopard	2
Kalij					x	Kalij	Macaque	Kalij	Leopard	5
Dove						x	Macaque	Marten	Leopard	7
Macaque							x	Macaque	Leopard	3
Marten								x	Leopard	6
Leopard									x	2

Similarly, the villagers were asked to identify the ‘Tolerance level’ for each animal listed earlier and indicate their population status according to them. These tolerance levels identified using ‘Likert scale’. A bipolar scaling method, used to measure either positive or negative response, which contains equal number of positive and negative position. The level of tolerance were categorised in terms of threats (crop raiding, livestock lifting, human attack or fear of presence of wild animal in their surrounding) perceived by the community from particular animal. The community were asked to categorise animals as

‘Intolerant animals’- animals from which they perceive maximum threat, which may force them to alter their livelihood, migrate, reduction in quantity of land cultivation/livestock holding.

‘Moderately tolerant animals’ – Animals they do not perceive much threat, but the increase in threats would make the community intolerant towards the animal.

‘Tolerant animals’ – The community does not bother about the threats perceived by them from that particular animal.

The community categorised Wild boar, Bear, Macaque, Marten and Leopard as Intolerant animals. Community were moderately tolerant to animals like Porcupine, Barking deer and Dove and the categorised as tolerant was Kalij pheasant.

Tolerance level for different animals

Problem animals	Tolerance level
Wild boar	Intolerant
Porcupine	Mid-tolerant
Barking deer	Mid-tolerant
Bear	Intolerant
Kalij	Tolerant
Dove	Mid-tolerant
Macaque	Intolerant
Marten	Intolerant
Kala	Mid-tolerant
Leopard	Intolerant

The community also stated they are tolerant 10% damage to their total agriculture land.

iv. Mitigation measures and its effectiveness

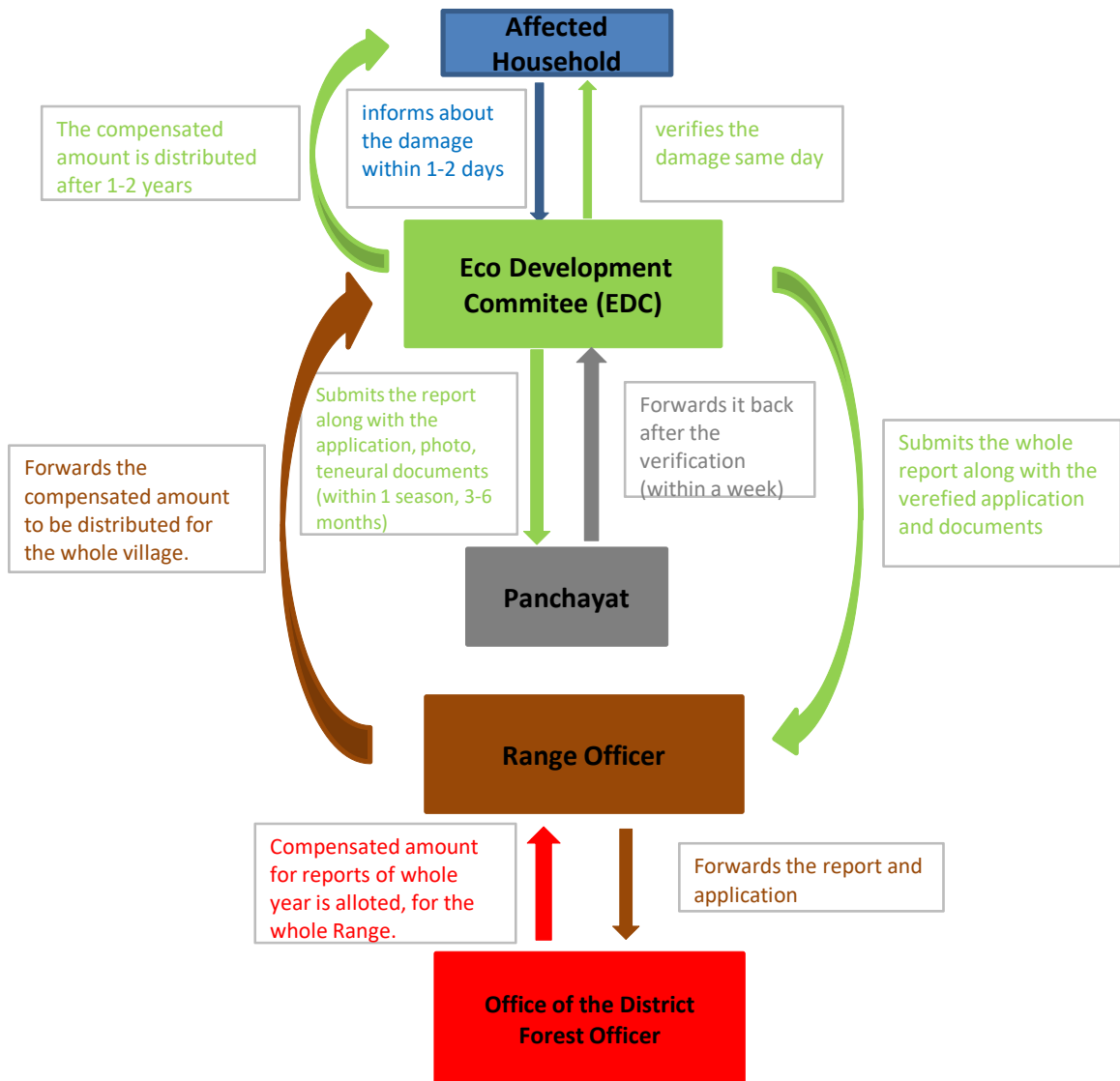
The communities were also asked to list the different mitigation measures used by them to guard their crops and rank them according to their effectiveness. They ranked guarding their crops during night from watch tower to be the most efficient measure, followed by fencing around their agriculture field using locally available resources and banging tin and chasing away animals. The community also indicated reduction in the quantity of cultivation as a preventive measure, which they state was a bit effective. However, placing scare crow was ranked the least.

v. Temporal pattern of change in HWC and their drivers of change

People of Upper Bhareng have been facing the damage from wild animals since the past. But according to them the damage has been intensified from few decades back only. Before setting up of the Rhodendron Sanctuary, there was no major restriction on human activities and people had cattle shed inside the forest, which they believe helped in maintaining the understory of the forest, which according to them now is one of the main drivers of HWC. People perceive different drivers like ban on hunting, grazing, ever increasing population of wild animals, scarcity of food for animals in the forest, less fruiting plants, less human activities in the forest and different rules and regulations favouring the protection of wildlife have helped the population to thrive in their surrounding, which has led to the increase in the intensity of conflict.

vi. Compensation scheme and its effectiveness

The community believes some strong reforms should be implemented on the current compensation mechanism to make it more efficient. They believe the amount being compensated is meagrely enough considering their damages and the time taken to be compensated is very long after all the bureaucratic procedures they go through to apply for it.



Flow chart of compensation scheme along with the timeline.

When asked to draw a flow chart along with its timeline to make us understand about this complex compensation mechanism, the community could give us a clearer idea about the time which their application takes to reach to the panchayats after which they had no idea. However, the community stated that they have stopped applying for compensation and that they instead want the government to implement the fund on other mitigation measures.

vii. Impacts of HWC and its possible solutions

The villagers suggested the HWC has definitely a huge impact on their livelihood as almost all of them depend on agriculture as their main source of income. The intense HWC over the years have made played a huge role in monetary loss, which in turn has led to giving up of agriculture as their livelihood and opt for other sources of income. They also believe that the monetary loss has also restricted them to provide better education for their children. They highlighted that the ever rising intensity of HWC is making them intolerant and increasing

the chances of retaliatory killing in cases of some villagers. Since most of the households nowadays have stopped practicing growing crops, there are lots of fields which are left barren.

When asked about different possible solutions which they think could mitigate the ongoing conflict, they emphasised four different solutions, namely:

- j. Proper fencing of the village boundary (either concrete, wired or chain)
- k. Promote cultivation of Horticultural crops favourable in the region (Strawberry, Blueberry, Apple, Ground apple etc).
- l. Good quality seeds and livestock's should be distributed by the governmental institutions.
- m. Promote alternate sources of livelihood (like tourism, home stays, dairy farming etc)

List of Participants

- | | |
|--------------------------|--------------------------|
| 1. Vikram Pradhan | 16. Mingma Dorjee Sherpa |
| 2. Lakpa Sangay Sherpa | 17. Mingur Sherpa |
| 3. Lakpa Temba Sherpa | 18. Tashi Doma Sherpa |
| 4. Passang Dorjee Sherpa | 19. Susang Sherpa |
| 5. P.T. Sherpa | 20. Deorit Doma Sherpa |
| 6. Lakpa Norbhu Sherpa | 21. Lakpa Sherpa |
| 7. Nim Nuri Sherpa | 22. Phur Temba Lama |
| 8. Dorjee Sherpa | 23. Passang Rinzi Sherpa |
| 9. Thsering Sherpa | 24. Thsering Sherpa |
| 10. Nim Dorjee Sherpa | 25. Phurba Sherpa |
| 11. Nim Temba Sherpa | 26. Dawa Sherpa |
| 12. Mingma Sherpa | 27. Phur Chiki Sherpa |
| 13. Lakpa Tenzee Sherpa | 28. Kee Doma Sherpa |
| 14. Lakpa Diki Sherpa | 29. Phurba Sherpa |
| 15. Mingma Diki Sherpa | |

Annexure IX

A report on awareness program on Human Wildlife Conflict at Government Senior Secondary School, Kitam, South Sikkim

An awareness program on ‘**Human Wildlife Conflict around Kitam Bird Sanctuary**’ was organised by the project team at Government Senior Secondary School, Kitam South Sikkim on 16th October 2017.

The goal of this program was to aware the students about Human Wildlife Conflict, around Kitam Bird Sanctuary, its different aspects and ways it can be managed. Furthermore, the participants were also sensitised about the significance of Protected Areas and the role it plays on conservation. A total of 96 students from standard IX and X the attended the program from the school along with the school staffs and Principal.

Government Senior Secondary School, Kitam, which is the only school for higher studies in the area, hosts students from almost all the villages around the Sanctuary, was the perfect venue for this program.

After the brief introduction about the project and our project sponsor Rufford Small Grant, UK. The program was continued by presentation by Mr. Vikram Pradhan and Mr. Roshan Kaushik (local biodiversity expert and conservation enthusiast). Where, the students were informed in brief about the protected areas in the state and the rich, diverse biodiversity it supports. Then a in-depth information on the history and importance of Kitam Bird Sanctuary and its role on conservation was presented.

The program continued with a brief description of Human Wildlife Conflict and its different possible causes like, human population expansion into wildlife habitat, increasing population of wildlife, deforestation, competition for food resources with humans and animals and loss of natural habitat. Different impacts of HWC were also presented, especially in context of Kitam, like cop raiding, livestock lifting, alteration of livelihood, damage to resources and properties etc. A detailed methods to mitigate HWC, was also discussed, which was broadly divided into two groups, namely ‘Direct method’ and ‘Indirect methods’. Measures discussed within direct method were; barriers (fences, trenches, walls etc), guards (human or animal), change in cropping pattern, change in type, timing or location of human activities, repellents (chemicals, urines) and land use planning. The measures discussed within indirect method were compensation and incentives, research and education, awareness and participation.

The presentation ended stating, why killing or being hostile towards the wild animals is not the answer and how we have to find ways to live with wildlife, which will help protect the whole environment for benefit of humans and animals alike. The program finished with queries from different students and teachers regarding the issue, which were made clear. The principal of the school Mr. Sanjay Acharya, a conservation enthusiast himself, also ensured his support for these kinds of programs in his school and hopes to collaborate with ATREE in the future.

The project team hope that the program like these will help diminish the negative experiences of the participants associated with the problem animals and generate the local support for conservation. So that the biodiversity within their surrounding are conserved and there is no retaliatory actions against the wildlife in the future.

Participants

1. Rajdeep Pradhan
2. Nikhil Regmi
3. Kritan Pradhan
4. Rahul Karariya
5. Prem Kumar Pradhan
6. Mikesh Rai
7. Manish Rai
8. Nitesh Subba
9. Nikhil Pradhan
10. Rohit Chettri
11. Binam Pradhan
12. Bibal Rai
13. Nabin Pradhan
14. Nima Tamang
15. Prashant Pradhan
16. Sailesh Tamang
17. Prakash Chettri
18. Sahadeep Rai
19. Bashant Chettri
20. Wangdup Tamang
21. Rohit Pradhan
22. Lakpa Zimbha
23. Asher Subba
24. Mandeep Thapa
25. Mahesh Lohar
26. Monos Kami
27. Prayash Rai
28. Shalam Subba
29. Sanjay Subba
30. Avishek Pradhan
31. Kunal Chettri
32. Manoj Dhamala
33. Arjun Bhujel
34. Dorjee Tamang
35. Amus Pradhan
36. Santosh Pradhan
37. Rupen Rai
38. Amrita Pradhan
39. Elishiba Darjee
40. Anusha Chettri
41. Sika Darjee
42. Sara Rai
43. Srijana Rai
44. Shradha Subba
45. Anila Bhujell
46. Mahima Dhamala
47. Prashana Subba
48. Ahlesh Rai
49. Amisha Tamang
50. Pragya Rai
51. Shriya Rai
52. Manisha Bishwakarma
53. Tshering Tamang
54. Kopila Pradhan
55. Mushkan Pradhan
56. Narbel Tamang
57. Royal Lepcha
58. Aditya Khati
59. Anurag Pradhan
60. La Tshering Tamang
61. Bishal Bantawa Rai
62. Sushma Rai
63. Bandana Rai
64. Sunita Rai
65. Renuka Bhujel
66. Priya Gurung
67. Ritu Subba
68. Arpan Pradhan
69. Enoch Gajmer
70. Nikita Tamang
71. Babita Darjee
72. Preeya Pradhan
73. Sushma Darjee
74. Percis Tamang

75. Nimket Tamang
76. Smriti Dhamala
77. Srijana Subba
78. Binita Bhujel
79. Meghna Rai
80. Michen Tamang
81. Neha Pradhan
82. Purni Maya Pradhan
83. Pranisha Sharma
84. Niruta Pradhan
85. Srijana Darjee
86. Sakila Rai
87. Dipika Sharma
88. Kalyani Pradhan
89. Bhawana Rai
90. Lediya Pradhan
91. Yangchen Tamang
92. Sarita Rai
93. Pranusha Sharma
94. Pabitra Pradhan
95. Kajal Pradhan

Annexure X

A report on awareness program on Human Wildlife Conflict at Government Senior Secondary School, Ribdi, West Sikkim

An awareness program on ‘**Human Wildlife Conflict around Barsey Rhododendron Sanctuary**’ was organised by the project team at Government Senior Secondary School, Ribdi, West Sikkim on 17th November 2017.

The goal of this program was to aware the students about Human Wildlife Conflict, around Barsey Rhododendron Sanctuary, its different aspects and ways it can be managed. Furthermore, the participants were also sensitised about the significance of Protected Areas and the role it plays on conservation. A total of 80 students from standard VIII to XII attended the program, along with the school staffs and Principal.

Government Senior Secondary School, Ribdi, is the only school for higher studies in the area, hosts students from almost all the villages’ on the Southern part of the Sanctuary and couple of villages from Singalila National Park, Darjeeling, West Bengal. So Ribdi Senior Secondary School was recognised to be the perfect venue for this program.

After the brief introduction about the project and our project sponsor Rufford Small Grant, UK. The program was continued by presentation by Mr. Vikram Pradhan and Mr P D Sherpa (local biodiversity expert, conservation enthusiast and a tourism entrepreneur from Bhareng with an experience of more than 20 years in the field). The students were informed in brief about the Protected areas in the state and the rich, diverse biodiversity it supports. Then a in-depth information on the history and importance of Barsey Rhododendron Sanctuary and its role on conservation was presented by Mr P D Sherpa.

The program continued with a brief description of Human Wildlife Conflict and its different possible causes like, human population expansion into wildlife habitat, increasing population of wildlife, deforestation, competition for food resources with humans and animals and loss of natural habitat. Different impacts of HWC were also presented, especially in context of Barsey Rhododendron Sanctuary, like cop raiding, livestock lifting, alteration of livelihood, damage to resources and properties etc. A detailed methods to mitigate Human Wildlife Conflict, was also discussed, which was broadly divided into two groups, namely ‘Direct method’ and ‘Indirect methods’. Measures discussed within direct method were; barriers (fences, trenches, walls etc), guards (human or animal), change in cropping pattern, change in type, timing or location of human activities, repellents (chemicals, urines) and land use planning. The measures discussed within indirect method were compensation and incentives, research and education, awareness and participation.

The presentation ended stating, why killing or being hostile towards the wild animals is not the answer and how we have to find ways to live with wildlife, which will help protect the whole environment for benefit of humans and animals alike. The program finished with queries from different students and teachers regarding the issue, which were made clear. The students present in the program were also assigned to submit an assignment on their

experiences on the Conflict or their encounter with the wild animal, by the Principal of the School. This according to him would make sure that they develop a habit of writing or documenting among the students.

The principal of the school Mr. P Gurung, a conservation enthusiast himself, also ensured his support for these kinds of programs in his school and hopes to collaborate with ATREE in the future.

The project team hope that the program like these will help diminish the negative experiences of the participants associated with the problem animals and generate the local support for conservation. So that the biodiversity within their surrounding are conserved and there is no retaliatory actions against the wildlife in the future.

Participants

1. Vikram Pradhan
2. Passang Dorjee Sherpa
3. Tshering Uden Bhutia
4. Regina Chettri
5. Pema Uden Sherpa
6. Lalita Manger
7. Mingma Doma Sherpa
8. Pem Lahmu Sherpa
9. Tashi Doma Sherpa
10. Amrita Subba
11. Prava tamang
12. Tashi Ongmu Sherpa
13. Anita Sampang
14. Lakpa Doma Sherpa
15. Mingma Namgyal Sherpa
16. Sarep Doma Sherpa
17. Tshering Choden Sherpa
18. Dawa Zangmu Sherpa
19. Amita Rai
20. Rinchen Ongmu Sherpa
21. Passang Phuty Sherpa
22. Basanti Rai
23. Tashi Doma Sherpa
24. Rima Rai
25. Tashi Doma Sherpa
26. Prasana Rama Manger
27. Phur Lahmu Sherpa
28. Monkumari Rai
29. Phur Lakhi Sherpa
30. Phurba Yangi Sherpa
31. Passang Diki Sherpa
32. Alisha Rana
33. Pemlahmu Sherpa
34. Passang Tamang
35. Udai Tamang
36. Sangay Thendup Sherpa
37. Nima Rinchen Sherpa
38. Bijay Rai
39. Umesh tamang
40. Urgan Doma Sherpa
41. Arati Rai
42. Zangmoo Sherpa
43. Phunchok Sherpa
44. Gyacho Sherpa
45. Ganga Sunwar
46. Nima Gyalpo Sherpa
47. Basanti Subba
48. Urmila Rai
49. Mingma Lahmu Sherpa
50. Nim Lahmu Sherpa
51. Pem Lahmu Sherpa
52. Tshering Lahmu Sherpa
53. Sabina Pradhan
54. Amit Biswakarma
55. Dashik Dorjee Sherpa
56. Suk Bdr Rai
57. Tshering Wangdi Sherpa
58. Rinchen Dorjee Sherpa
59. Suraj Rai
60. Phurba Sherpaa

61. Shamdup Dorjee Sherpa
62. Urgen Sherpa
63. Bikram Rai
64. Tshering Diki Sherpa
65. Sushmita Tamang
66. Sarita Rai
67. Sonika Pradhan
68. Tashi Ongmu Sherpa
69. Mamta Bishwakarma
70. Da Ynagi Sherpa

71. Nim Chiki Sherpa
72. Pushpa Manger
73. Kaita Pradhan
74. Santa Kumar Rai
75. Sangay Thendup Sherpa
76. Yogesh Pradhan
77. Dewash Sherpa
78. Tshering Dorjee Sherpa
79. Lakpa Dorjee Sherpa
80. Sharab Ongdi Sherpa

Annexure XI

A Report on Farmers Knowledge Exchange Program – visit by the farmers from Sikkim

Venue: Upper Sepi, Singalila landscape, Darjeeling, West Bengal

Date: 19th February – 20th February 2018

A two day farmer’s knowledge exchange program was organised by Vikram Pradhan, for the project ‘Developing strategies to mitigate Human-Wildlife in Sikkim Himalaya, India’ funded by Rufford Small Grants, UK at Upper Sepi revenue village, Darjeeling on the 19th and 20th February 2018 to explore and exchange knowledge on Human-Wildlife conflict and the mitigation strategies adopted by the communities of Upper Sepi. A total of 28 participants from villages of Lower Kitam, Belbotay, Manpur, Upper Ribdi, Upper Bhareng and Upper Sepi participated in the program.

The first day of the program was entrusted for presentations on Human Wildlife conflict (HWC) as an issue and different mitigation measures and convergence, along with several interactions on experiences and challenges faced by the communities to manage HWC. The second day of the program was assigned for village exploration and observation of the interventions, especially ‘Bio-fence’ which was implemented by the communities of Upper Sepi with the support from the forest department and ATREE (Ashoka Trust for Research in Ecology and the Environment). The mitigation work was solely taken up by the FPC’s (Forest Protection Committee) and the community members of Sepi while ATREE provided the technical support.

The objectives of the meeting were to learn and discuss the current mitigation strategy adopted by the community in Upper Sepi along with issues, challenges and potentials of bio fence; to understand the dynamics of convergence among various government departments for mitigation work.

Key Issues Discussed:

- Agriculture is one of the key livelihood activity practiced in the Darjeeling-Sikkim Hills. Farming is labour intensive and requires additional input costs however the output is ever depreciating due to increasing crop depredation by wildlife. Crop depredation by small mammals and other animals causes loss of income and is leading to situation where farmers are losing interest in agriculture.
- Loss and damage of crops by animals like wild pig, porcupine, deer, bear, monkey and peacock (Kitam) and livestock predation by leopards are high in Singalila landscape and surrounding Ribdi and Bhareng in Sikkim.
- Farmers perceive that the upcoming generation would not take up agriculture as an occupation. After receiving higher education the youth move out to larger towns and cities for better employment opportunities hence decreasing the scope of agriculture in the future.

- Focus should be on alternative livelihood opportunities besides agriculture. Community managed eco-tourism activities and home stays have potential and are being operated in Bharang and Kitam respectively. They are also exploring other avenues like dairy farming, planting horticultural crops etc in Sikkim.
- Traditional mitigation techniques are ineffective and no longer appropriate or adequate. Mitigation methods practiced are bamboo fencing, pine tree branch fencing, tin fencing, digging trenches, making loud sounds by beating tins and bursting of fire crackers are temporary measures practiced by the farmers.
- Compensation policies are bureaucratic and lengthy. Most of the times it is an inconvenience and a tiresome process to get the compensation and some of the rules are impractical leading to benefits not going to the vulnerable and poor.
- Mitigation for HWC on a pilot scale taken up in Upper Sepi has proved to be effective so far. The 3 kms long barbed wire fence was re-erected and strengthened by planting saplings of *Viburnum erubescens*, *Leucosceptrum canun*, *Symplocos taurina*, *Eurya japonica* and Chuto Kesari. However, the bio fence requires regular monitoring in the initial phase. The mitigation work was solely taken up by the FPC's and the community members of Sepi while ATREE provided the technical support.
- Live fencing /Bio fencing does not work against wild animals like monkeys or porcupines, it does not stand as a strong barrier against deer. However, it seems to work against wild boars, one of the most prolific crop raiders in the region. One strategy shall not work for all, mixed methods could be adopted.
- Convergence work on HWC mitigation – bio fence/ live fencing through MGNREGA'S Cell and the Forest Dept is successfully ongoing in two other villages in Singalila landscape – Gurdum forest village and Srikhola Siranigoan wherein the Forest Department is providing the material i.e barbed wire while the Block is providing the Labour cost through MGNREGS.

At the second day of the meeting it was proposed that it would be useful if a committee/group could be established in each village, which will work solely on managing and addressing HWC, implementing mitigations measures and carrying out all the activities of involving different government and non government stakeholders to address HWC in the village. This group would then be guided by the project team.

Finally, all the participants concurred that Bio-fencing can be incorporated as an effective mitigation strategy against wild animals in all four study villages of Kitam Bird Sanctuary and Barsey Rhododendron Sanctuary.

Participants list and details

	Participants from Sikkim	Address	Designation
1	Passang Dorjee Sherpa	Upper Bhareng	EDC President, Ribdi-Bhareng
2	Lakpa Dorjee Sherpa	Upper Bhareng	EDC member/ Farmer
3	Lakpa Norbu Sherpa	Upper Bhareng	EDC member/ Farmer
4	Phurba Dorjee Sherpa	Upper Ribdi	EDC member/ Farmer
5	Mingur Sherpa	Upper Bhareng	EDC member/ Farmer
6	Sonam Sherpa	Upper Ribdi	EDC member/ Farmer
7	Mingma Dorjee Sherpa	Upper Bhareng	EDC member/ Farmer
8	Sonam Sherpa	Upper Ribdi	EDC member/ Farmer
9	D.B. Pradhan	Lower Kitam	EDC President, Kitam
10	Mon Kumar Tamang	Manpur	Farmer
11	Subash Pradhan	Lower Kitam	EDC member/ Farmer
12	Bal Krishna Sharma	Lower Kitam	EDC member/ Farmer
13	Dak Man Pradhan	Lower Kitam	EDC member/ Farmer
14	Lal Bahadur Rai	Manpur	Farmer
15	Micheal Lepcha	Belbotay	EDC member/ Farmer
16	Mani Kumar Pradhan	Belbotay	EDC member/ Farmer
17	Vikram Pradhan	ATREE	Research Associate

Participants from Upper Sepi

18	Pramod Pradhan	Upper Sepi	Cashier CBT, U. Sepi/Farmer
19	Jayanti Rai	Upper Sepi	Member CBT, U. Sepi/Farmer
20	Bhabi Chand Rai	Upper Sepi	President CBT, U.Sepi/Farmer
21	Bikash Rai	Upper Sepi	Member CBT
22	Dil Bahadur Rai	Upper Sepi	Member CBT
23	Sonam Sherpa	Upper Sepi	Member CBT
24	Man Bahadur Rai	Upper Sepi	Member CBT
25	Poonam Rai	ATREE	Program Associate-HWC
26	Tenzing Sherpa	ATREE	Field Staff
27	Hemraj Rai	ATREE	Field Staff
28	Laxmi Rai	ATREE	Field Staff

Annexure XII

A report on Community based meeting to plan mitigation strategies for the village, Lower Kitam

Date – 30/01/2018

Venue – Panchayat Office, Kitam, South Sikkim.

A Community based meeting to plan mitigation strategies to address Human Wildlife Conflict of Lower Kitam village was organised at Panchayat office, Kitam on 30/01/2018. This was participated by the elected members of Panchayat (local self government at a village level), Eco-Development Committee (works along with the state forest department to manage the surrounding forest) members and local enthusiastic community members.

The meeting was specifically focused on developing strategies to manage HWC of the village. The meeting started with discussing the different possible solutions, which were suggested by the community during the PRA (Participatory Rural Appraisal), which was conducted during the initial stages of the project at Lower Kitam. These possible solutions included:

- e. Proper fencing of the village boundary (either concrete, wired or chain)
- f. Culling of the wild boar population.
- g. Fully compensate the damage done by the wild animals.
- h. Promote alternate sources of livelihood (like tourism, dairy farming, apiary etc)

Out of all the possible solutions mentioned above, all the solutions were discussed in detail and decided what could be further done to implement these solutions and how could it be achieved. The details of the discussion are listed below:

- i. The solution/option of culling wild boar population and full compensation of the damage by the state forest department was discarded as possible viable solution by all the participants. As these options were not practically feasible.
- ii. To form a group/committee among the community members, who would specifically focus on addressing HWC of the village, their task along with the help of community and local panchayat would be to address the problem to pertinent government or non-governmental stakeholders. Link the mitigation activities with different government schemes like NERLEP (North East Rural Livelihood Project), MNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme) etc.
- iii. It was also decided that instead of demanding concrete, wired or chained fencing of the boundary. The community would demand for a bio fence/live fences along with a barbed wire. This would be more sustainable, effective and require less maintenance, than other forms of fencing.
- iv. The project team plans to organise an exposure trip for at least 10 community members, including a panchayat and EDC members, to Upper Sepi village of Singalila range in Darjeeling. Where the community members after the intervention of ATREE (Ashoka Trust for Research in Ecology and the

Environment) have been able to control conflict, by fencing the village boundary with 'Bio fence'.

The project team hopes this trip can help the participants to explore and exchange knowledge on HWC and the mitigation strategy adopted by the community of Upper Sepi especially 'Bio fence'.

- v. The participants of the exposure trip would then explore the feasibility, limitation and effectiveness of the Bio fence and decide whether the Bio fence will be viable and effective solution for the village.
- vi. The participants also suggested that emphasis should also be given to promote sustainable alternate source of livelihood.
- vii. They also stressed that Kitam Bird Sanctuary being an IBA (Important Bird Area) has a potential of being a popular birding destination and trainings and workshops related to birding would of great help for them.
- viii. The other potential source of alternate livelihood, which was mentioned during the PRA, should also be emphasised discussed the participants and some detailed trainings and workshops would be very much welcomed.

Participants

1. Roshan Kawshik
2. Syam Kumar Subba
3. Savitri Chettri
4. Ved Prakash Bhujel
5. Sandeep Subba
6. Padam Singh Bhujel
7. Bina Pradhan
8. D.B Pradhan
9. Pravesh Rai
10. Kewal Chettri
11. Vikram Pradhan

Annexure XIII

A report on Community based meeting to plan mitigation strategies for the village, Upper Bhareng

Date – 09/02/2018

Venue – Upper Bhareng, West Sikkim.

A Community based meeting to plan mitigation strategies to address Human Wildlife Conflict of Upper Bhareng village was organised at Upper Bhareng on 09/02/2018. This was participated by the elected members of Panchayat (local self government at a village level), Eco-Development Committee (works along with the state forest department to manage the surrounding forest) members and local enthusiastic community members.

The meeting was specifically focused on developing strategies to manage HWC of the village. The meeting started with discussing the different possible solutions, which were suggested by the community during the PRA (Participatory Rural Appraisal), which was conducted during the initial stages of the project at Upper Bhareng. These possible solutions included:

- e. Proper fencing of the village boundary (either concrete, wired or chain)
- f. Promote cultivation of Horticultural crops favourable in the region (Strawberry, Blueberry, Apple, Ground apple etc).
- g. Good quality seeds and livestock's should be distributed by the governmental institutions.
- h. Promote alternate sources of livelihood (like tourism, home stays, dairy farming etc)

Out of all the possible solutions mentioned above, all the solutions were discussed in detail and decided what could be further done to implement these solutions and how could it be achieved. The details of the discussion are listed below:

1. To form a group/committee among the community members, who would specifically focus on addressing HWC of the village, their task along with the help of community and local panchayat would be to address the problem to pertinent government or non-governmental stakeholders. Link the mitigation activities with different government schemes like NERLEP (North East Rural Livelihood Project), MNREGS (Mahatma Gandhi National Rural Employment Guarantee Scheme) etc.
2. It was also decided that instead of demanding concrete, wired or chained fencing of the boundary. The community would demand for a bio fence/live fences along with a barbed wire. This would be more sustainable, effective and require less maintenance, than other forms of fencing.
3. The project team plans to organise an exposure trip for at least 10 community members, including a panchayat and EDC members, to Upper Sepi village of Singalila range in Darjeeling. Where the community members after the intervention of ATREE (Ashoka Trust for Research in Ecology and the Environment) have been able to control conflict, by fencing the village boundary with 'Bio fence'.

The project team hopes this trip can help the participants to explore and exchange knowledge on HWC and the mitigation strategy adopted by the community of Upper Sepi specially 'Bio fence'.

4. The participants of the exposure trip would then explore the feasibility, limitation and effectiveness of the Bio fence and decide whether the Bio fence will be viable and effective solution for the village.
5. Regarding the promotion of cultivating horticultural crops and distribution of good quality seeds by the government institutions. The panchayat would again write an application to the concerned department regarding these matters.
6. In terms of promoting alternate sources of livelihood, the project team plans to organise a two day long workshop on more sustainable and effective methods on Dairy farming, involving the available local breed of cattle's.
7. The project team plans to involve staffs from ATREE, as the resource persons for the workshop, who are well experienced and qualified in training local communities for Dairy farming.
8. Sikkim being a prominent tourism destination and the government focusing mainly on promoting tourism on rural areas. The other alternate source of livelihoods suggested by the community, which mainly involves tourism activities. The panchayats and community members decided to approach and seek more interventions from the state department of tourism.

Participants

- | | |
|---------------------------|-------------------------|
| 1. Vikram Pradhan | 11. Abimaya Chettri |
| 2. Akash Das Rai | 12. Dawa Dorjee Sherpa |
| 3. Lakpa Temba Sherpa | 13. Beena Tamang |
| 4. Dorjee Sherpa | 14. Ki Tshering Sherpa |
| 5. Sonam Sherpa | 15. Lakpa Norbhu Sherpa |
| 6. Nimtembe Sherpa | 16. Da Tshering Sherpa |
| 7. Nim Dorjee Sherpa | 17. Nim Diki Sherpa |
| 8. Mingyur Sherpa | 18. Des Kit Lepcha |
| 9. Tshering Yanzee Sherpa | 19. Susang Sherpa |
| 10. Ki Doma Sherpa | 20. Tashi Doma Sherpa |

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