

## Final Evaluation Report

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Your Details	
Full Name	Ashok Kumar Ram
Project Title	Landscape level modelling of Asian elephant ( <i>Elephas maximus</i> ) habitat, home range and human elephant interactions in Terai Arc Landscape (TAL) Nepal.
Application ID	26302-B
Grant Amount	£9,990
Email Address	<a href="mailto:ashokrink11@gmail.com">ashokrink11@gmail.com</a>
Date of this Report	Aug 24, 2020

**1. Indicate the level of achievement of the project’s original objectives and include any relevant comments on factors affecting this.**

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Landscape-level habitat analysis of the Asian Elephant.				MaxEnt species distribution models (SDMs) were used to generate habitat suitability of the study area and Fragstat was used for analysing habitat fragmentation.
To estimate the home range of elephants				We had collared two elephants from Chitwan National Park and one from Bardiya National Park.
Landscape-level HEC assessment				We have developed a semi-structured questionnaire for HEC assessment and conducted a questionnaire survey at every 10th household in the seven identified villages of the study area.

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.**

The research project on “Landscape level modelling of Asian elephant (*Elephas maximus*) habitat, home range and human elephant interactions in Terai Arc Landscape (TAL) Nepal” aims to assess landscape level habitat status, human elephant conflict (HEC), assess the landscape level home range and carry out the communication and outreach programmes in the study area. We started our project in October 2019 and completed in July 2020. The unforeseen difficulties experienced in this study were people’s expectation about the resources, that some previous researcher/NGO people had assured local people about providing monetary support in the near future but the local people didn’t meet those people in their vicinity again. So, some local people were aggressive, when we again reached their houses to interview the HEC events, though we had tactfully handled the situation with all transparency about the project background and what our aims for this project. We also convinced them that though there is not direct financial support, we will be supporting them with other resources like equipment’s support for Rapid Response Teams (RRTs) and Community Based Antipoaching operations Team (CBAPOs). We talked about our project in detail and requested their participation in our RRT, HH meetings and stakeholder consultation meeting. They have joined our meetings and enjoyed them also.

Another unforeseen difficulty seen during our project was the COVID 19 pandemic problem, though we had completed most of the field work during October 2019 and March 2020. The pandemic partly hampered the school teaching programme and education materials preparations. We undertook necessary safety measures while conducting a few events of our school teaching programme and that’s the reason

why it was more hectic and team members had to work overtime to ensure completion of task.

**3. Briefly describe the three most important outcomes of your project.**

The research project on Asian elephant has been carried out for landscape level modelling of the Asian elephant’s habitat, home range, assessing human-elephant interactions and carrying out community-based outreach programme. We selected the Terai-Arc Landscape as our study area as it includes six protected areas and six biological corridors. This area facilitates the ecological functionality of migrating wildlife and is also known for its conflict hotspots area. The major outcomes of our project have been described below:

a. Assessment of human-elephant interaction

A survey conducted in a semi-structured questionnaire was particularly important to enable us to understand the spatial and temporal distribution and pattern of interactions between human and elephants occurring over the landscape area. We covered the conflict data collection district-wise for the last 15 years and cumulative data is shown in below figure:

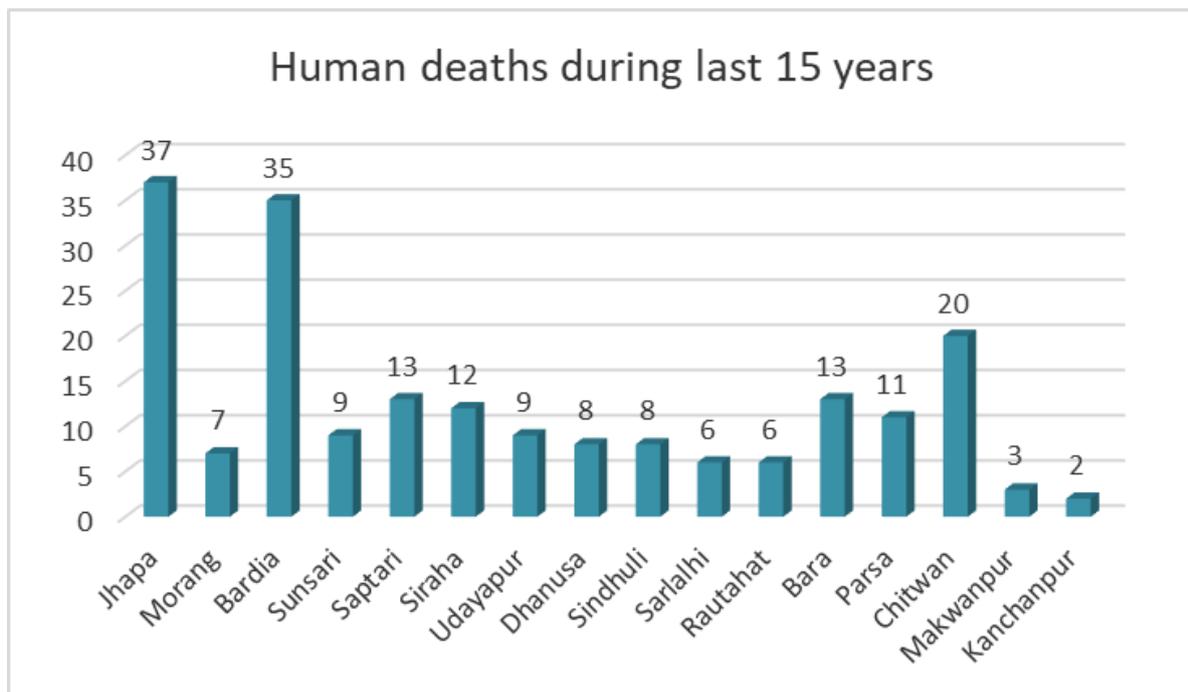


Figure 1: District-wise data of human death due to human-elephant conflict

The data tells us that 197 people died during last 15 years and 120 people were injured as a result of conflicts with elephants. There is also the impact in people’s livelihood as elephants raid farmed crops and destroy property in search of food. However, it is not only people’s lives and livelihoods at risk. It is also the elephants’ lives at risk as data suggests two elephants are killed each year in retaliation (Neupane et al., 2017; Neupane, Johnson and Risch, 2017).

The results highlight that major causes of human casualties are during direct encounters while people try to chase them, and the majority of people attacked by elephants were drunk. Such results indicate that there is a huge gap in understanding the behaviour of elephants and how we need to act when there is elephant attack or presence in our vicinity. A proactive community awareness programme is important which we also carried out in this programme. Moreover, the research results and findings are particularly important for any sector involved in elephant conservation including government management and action plans. For example, while conducting our conservation programme at a micro-level, we need to focus on Jhapa district in eastern Nepal and Bardiya in the west. Also, human-elephant conflict is more severe outside protected areas than inside. Thus, it is important to gather data at macro and micro-levels while allocating the budget for preparation and implementation of elephant conservation plans, preparing policy and guidelines such as compensation relief policy and managing squatters who have been living by encroaching on forest and protected areas.

b. Community-based outreach programme

The community-based outreach programme includes training conservation groups, a sensitisation and awareness programme for community members, school teaching programmes, an elephant conservation radio programme and preparation of education materials.

We reached out to 13 Rapid Response Team (RRTs) and Community-based Anti-poaching Unit (CBAPUs) through 15 events of a capacity building programme on elephant conservation, conflict mitigation measures and human-elephant coexistence (HECx). RRTs and CBAPUs are frontline community-based conservation groups working voluntarily for conservation of wildlife. The training we provided was particularly important to strengthen the capacity and build knowledge on elephant behaviour on aggression feeding, breeding ecology and their involvement in human-elephant conflict mitigation. The physical resources such as spotlights, hand mikes and fuel provided to RRTs and CBAPUs bolstered their involvement and mobilisation in forest patrolling, information sharing and mitigation of HEC. Such kind of frequent incentives in the form of knowledge sharing and resources aid has been useful to maintain positive attitudes, building accountability of communities and prompting them for conservation programmes. Moreover, 457 community people benefitted from conservation and awareness programme stakeholder consultation and RRTs strengthening programme. Local people were fond of participating in this project and they appreciated such programmes and have requested to continue these kinds of activities in their territory. The resource persons mobilised were rangers, social mobilisers, assistant warden and eco-club members.

Details of the participants of capacity building programmes have been given below.

Table 1: Participants of capacity building program on HECx

SN	Date of program	Location	Participants affiliation	Participants number		Total number
				M	F	
1	12-Dec-19	Parsagadhi-4, Parsa	RRT members	21	5	26
2	15-Dec-19	Thori-5, Parsa	RRT members	23	3	26
3	19-Dec-19	Amlekhganj-21, Bara	CBAPO members	15	11	26
4	31-Dec-19	Manhari-7, Makwanpur	RRT members	12	14	26
5	1-Jan-20	Manhari-7, Makwanpur	RRT members	13	13	26
6	15-Jan-20	Thori-4, Parsa	RRT members	15	13	28
7	18-Jan-20	Jitpur simara- 21, Bara	RRT members	30	5	35
8	2-Feb-20	Jitpur simara- 21, Bara	RRT members	19	15	34
9	5-Feb-20	Manhari-7, Makwanpur	RRT members	10	13	23
10	13-Feb-20	Manhari-8, Makwanpur	RRT members	23	10	33
11	19-Feb-20	Jitpur simra-1, Bara	CBAPO members	15	19	34
12	24-Feb-20	Parsagahi-2, Parsa	CBAPO members	19	5	24
13	15-Mar-20	Thori-4, Nirmalbasti	CBAPO members	25	8	33
14	19-Mar-20	Barah-9, Sunsari	CBAPO members	24	14	38
15	20-Mar-20	Prakashpur-10, sunsari	CBAPO members	30	15	45
<b>Total</b>				<b>294</b>	<b>163</b>	<b>457</b>

The conservation awareness programme also reached out to teacher's network, eco-clubs and students of 20 higher secondary schools. School teaching programme to students and eco-clubs was important to encourage students to participate in forest conservation, the role of elephants in bio-diversity conservation and HECx.

An episode of 30 minutes long conservation radio programme on " Save the Elephants" with main slogan "Hatti Mero Sathi" was prepared and broadcast through the local Narayani FM and Birganj Radio 103.8 MHz. This FM has broader coverage and has better responses from local students, local people and other stakeholders.

We published 1000 calendars, 1000 pamphlets and 1000 brochures having elephant conservation messages and distributed them throughout the study area districts. Such materials cover a wider range of audience and primary and secondary target group of research study. I have attached the soft copy of those calendars, posters and brochures.

c. Habitat analysis and assessment of home range and distribution patterns

While working on elephant ecology, it is extremely necessary to understand home range, forest cover change over the period of time and how the population of elephants is distributed along the forest and the other land cover area. We had carried out the satellite telemetry work for home range estimation under which we collared 11 elephants (10 bulls and 1 female). The telemetry work let us know the near real-time presence of elephant in a particular area and therefore, helped us to understand the possible conflict zone for early warning and thus, minimise human casualties and property losses. The regular monitoring of collared elephants was useful to assess feeding behaviour, habitat preferences along the landscape, their frequency of involvement in crop raiding, their herding pattern and isolation. We found out that 17.78% of forest cover was lost from 1975 to 2020. The maximum forest loss occurred in the central region (2704.33 km<sup>2</sup>) followed by eastern (2039.85 km<sup>2</sup>), far western (1946.33 km<sup>2</sup>) and western region of Nepal (1367.03 km<sup>2</sup>) in the past nine decades. We found out that only 12069 km<sup>2</sup> habitat is suitable out of 42456 km<sup>2</sup>. It is evident that the forest area is decreasing and forest edge increasing due to improper construction of physical infrastructure, without considering the negative impact in biodiversity. The result in habitat assessment gives us the insight that in future the decrease in forest cover, it is likely to negatively impact on elephant habitat and its population and also result in increased HEC.

The overall outcomes of the project are documentation of information of elephant habitat status, HEC and knowledge sharing. This result is useful to policy/decision makers, government bodies, experts, I/NGOs, community-based conservation groups, researchers, students, communities and laypersons.

**4. Briefly describe the involvement of local communities and how they have benefitted from the project.**

The Nepal Government initiated participatory wildlife conservation in 1997 and this has continued through the buffer zone community development programme. Participatory conservation is funded by providing 50% of the park income to the community for community development and natural resource management. Community development, conservation, income generation activities, and conservation education programmes are some of the major programmes carried out through community for human wildlife conflict mitigation and biodiversity conservation. However, this is not sufficient and need to continue throughout the whole landscape.

Our project had carried out all the activities with the support of local communities and completed them in synergy. Some programmes were conducted by local CBOs and eco-clubs along with our research team. We have also included 13 RRTs and five CBAPOs, along with two teachers' networks and five eco-clubs to implement school education, community awareness and the Save the Elephant radio programme. Local people were also involved in project progress meetings, stakeholder consultation meeting, the project work plan and its execution.

"Save the Elephant" radio programmes were jointly conducted by local eco-clubs, Parsa National Park, Chitwan National Park along with the researcher team. Similarly,

five eco-clubs from Bara, Parsa and Makwanpur districts were selected and mobilised for school education. They have conducted school conservation classes in 17 different secondary level schools of Bara, Parsa and Makwanpur district.

Local people directly benefited by taking part in project planning and reviewing the project progress. Similarly, 457 RRTs members and 100 students from five eco-clubs were sensitised and trained about elephant behaviour and elephant handling during human-elephant conflict. Similarly, 1973 students from 17 secondary level schools were sensitised and 240 teachers also benefited by conducting this programme.

People from the study area have a better response for "Save the Elephant" radio programme and they have requested to broadcast this conservation radio programme again. With this radio program >5000 local people benefitted. After conducting this radio programme, HEC was reduced by 50% in the study area.

Side by side, we had also conducted stakeholder meetings with national park staff, district forest office staff, buffer zone user committee's members and community forestry user group members. They were also happy and made a positive response that they knew a lot from this project and ultimately it will help to reduce human-elephant conflict and make a conducive environment for human-elephant coexistence. They recommended this project be continued in the future.

We had conducted 49 classes at the secondary school level. Out of 1973 students, 1214 students were females. So, we found that 63.32% female students were benefited from this project. Therefore, this project was one of the most successful programmes to convey the elephant conservation message to local people for improved successful elephant conservation in Nepal and to prepare a conducive environment for human-elephant coexistence.

Table 2: Details of participants of school teaching programme

S.N	Date	Name of schools	District	# of male student	# of female student	# of teachers	Grant Total
1	21-Jan-20	Shree Rastriya Madhyamik Bidhaalya, Rangapur	Parsa	58	60	15	133
2	22-Jan-20	Shree Deep Narayan Adarsh madhyamik Bidhalaya	Parsa	58	88	11	157
3	23-Jan-20	Sree Rastriya Ma.Bi. Baderwa	Parsa	38	50	15	103
4	24-Jan-20	Shree Pasupatinath Ma.Bi	Makwanpur	25	58	14	97

5	25-Jan-20	Shree Nirmal Ma.Bi	Makwanpur	43	101	10	154
6	26-Jan-20	Sri Bal jeevan Jyoti Ma.Bi	Makwanpur	44	64	12	120
7	27-Jan-20	Sri Gyan Batika MaBi	Parsa	24	51	14	89
8	28-Jan-20	Sri MaBi	Parsa	57	105	13	175
9	29-Jan-20	Sri Rastriya MaBi	Parsa	46	70	11	127
10	30-Jan-20	Sri Rastriya MaBi	Bara	30	65	10	105
11	5-Feb-20	Sri Nepal Rastriya MaBi	Bara	42	67	15	124
12	6-Feb-20	Sri Nepal Mabi	Bara	42	69	15	126
13	7-Feb-20	Sri Mahendra Mabi	Makwanpur	81	64	21	166
14	8-Feb-20	Sri Arniko Mabi	Makwanpur	15	25	10	50
15	9-Feb-20	Sri Budhha Mabi	Makwanpur	64	102	21	187
16	10-Feb-20	Sri Bhoj siddha mabi	Makwanpur	41	90	16	147
17	11-Feb-20	Sri Rastriya Rotari MaBi	Makwanpur	51	85	17	153
		Total		603	1214	240	2213

#### 5. Are there any plans to continue this work?

Yes, I have a plan to continue my work with elephants. We found that there are ~200 elephants surviving in Nepal. Among these ~50 elephants are resident in the Chitwan Parsa complex and the severity of human-elephant conflict here is also high. So, our next plan is to conduct research work population status, action based public awareness for mitigating human-elephant conflict along with documentation of these

studies by publishing in peer reviewed journals. For this project work, we will undoubtedly need financial support from the organisations like The Rufford Foundation.

**6. How do you plan to share the results of your work with others?**

We had shared the project results of this project with the Department of National Parks and Wildlife Conservation (DNPWC) and other stakeholders by organising a Zoom meeting and stakeholder consultation meetings. We also sent the final project report to the DNPWC, Nepal and requested them to implement the recommendations of this project. I will also present this report in relevant workshops and seminars. If possible, this effort will be presented in Rufford Foundation grantee meeting. I will publish the report findings locally as well as in international peer reviewed journals.

**7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?**

Activities	Proposed scheduled time (month)	Actual time it took	Revision in time schedule	Remarks
Preliminary Field visit and Stakeholder consultation meetings	Oct-Nov 2019	Nov -Dec 2019		
Landscape-level habitat analysis of the Asian Elephant.	(Jan-May 2020)	(Jan-July 2020)		
Elephant sign survey for occupancy	Nov 2019-February 2020)	Nov 2019-February 2020)		
Telemetry for home range estimation:	(Sep-Nov 2019).	(Sep-Nov 2019).		
Landscape-level HEC assessment (Social survey for HEC assessment	(Jan-May 2020)	(Jan-May 2020)		
Habitat suitability analysis	(Jan-May 2020)	(Jan-May 2020)		
Conservation awareness program				
Strengthening the Rapid Response Team (RRT)	(Oct-Nov 2019)	(Oct-Nov 2019)		
Teachers network and Eco-club sensitization	(Feb-May 2020)	(Feb-May 2020)		
Project progress sharing meetings.	(Dec 2019-Jan 2020)	(Dec 2019-Jan 2020)		

Report preparation and submission	Sep-Oct 2017	May-June 2018		
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**8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.**

Items	Budgeted (in £)	Actual amount (in £)	Difference (£)	Comments
Preliminary field visit to all the possible HEC areas in the study area (10 places@£150)	500	350	-150	
Stationery, photocopy and print (it is proposed for the HEC data set preparation, occupancy field work data set preparation) (1*@£140)	140		-140	
Spotlights and refreshment support to RRTs (5*@£200)	1000	700	-300	
Telemetry work (2 elephants were collared with GPS collar of African Wildlife Tracking. Only operation cost is proposed for security staffs, elephants and park staff's food cost for 20 people for 20 days. Collar was provided by Riko through NTNC and PNP (2@£3500)	2000	1350	-650	
Project progress sharing meeting (3 meetings @£40)	120	120		
Daily subsistence allowance to field assistants for data collection (5*50@£5)	1500	1250	-250	
Team leader (Daily subsistence allowance (120-man days@£6)	1080	720	-620	
Postures and calendar publication (1000 copy@£0.50)	500	500		
40 conservation classes will be organized in 20 different higher secondary and secondary schools (40@£10)	400	600	+200	

Communication, internet and report preparation	100			
Occupancy Field work, logistic arrangement for 45 days with night camping (tea, snacks, food, breakfast arrangement for 10 naturalists during camping) 10*45@£4) for 2 seasons	1350	1350		
12 episodes Save the Elephant Radio program operated by local CBAPOs 12 episode @£50	600	600		
Community based RRT strengthening activities in the 10 RRT and CBAPOs (5 trainings@£100)	500	750	+250	
Community based RRT mobilization (10 team mobilization support for fuel and food allowances 10@£150)		1500	+1500	
Stakeholder consultation meetings (7@£50)	200	200		
<b>Total</b>	<b>9990</b>	<b>9990</b>		

#### 9. Looking ahead, what do you feel are the important next steps?

I am grateful to the Rufford Foundation that I have been awarded with a 1<sup>st</sup> RSG Booster Grant to work with elephants. I had worked on elephant habitat, home range and human-elephant conflict. Though home range study is ongoing, and it will take time to analyse the final home range. During my study, we found that elephant population is increasing in Nepal and very less elephant population study was carried out except by Pradhan et al., 2011.

So, there is a gap to study elephant population through genetic analysis. I am planning to do population status study in the next step from RSG grant.

#### 10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes, I have used the Rufford Foundation logo on brochures, pamphlets, posters and calendars produced under this project for dissemination of message on human-elephant coexistence and elephant ecology and their aggression along with elephant handling procedure. Some of these postures and pamphlets were also sent to Chitwan National Park, Parsa National Park, Koshi Tappu Wildlife Reserve and the Institute of Forestry (IOF) Hetauda.

The Rufford Foundation had certainly received publicity during my project work. Local people were very much interested to know about The Rufford Foundation grant. We also gave information about RF working theme and application procedure for grant

to whoever interested. IOF students were very much interested to apply for future research work and want to work with us.

**11. Please provide a full list of all the members of your team and briefly what was their role in the project.**

Name of Team members	Role in the project
Ashok Kumar Ram	He is PI of this project.
Dr. Kamal Gairhe	Dr. Gairhe has supported in capturing and collaring elephants.
Prabin Shrestha	Mr. Shrestha has supported in field work.
Mr. Nabin Kumar Yadav	Mr. Yadav has supported on field work, and analysis as well as modelling on GIS.
Ms. Binita Khanal	Ms. Khahal has supported on field work, data entry analysis.
Mr. Suman Acharya	Field work, HH survey/Occupancy survey
Dinesh Ghimire	Field work, HH survey/ Occupancy survey
Mr. Binod Acharya	HH survey
Mr. Bardri Chaudhari	Field work, HH survey
Bivek Chaudyary	Field work, HH survey
Mr. Ram Sahi	Occupancy survey
Kiran Rijal	Capturing and collaring elephant
Dr. Amir Sadaula	Capturing and collaring elephants
Mr. Budhan Chaudhary	Mobilizing captive elephants and staffs to capture wild elephants
Mr. Shankar Luitel	HH survey and occupancy work
Ramesh Thapa	Conducting conservation education
Mr. Dipak Tiwari	Conducting conservation education program/ sensitizing eco-clubs.
Mr. Devi Prasad Dahal	Sensitizing RRT/CBAPOs/BZUC/BZCFUGs
Mr. Padam Titung	Chair, Buffer zone management council.
Binda Sardar	Driver, Koshi Tappu Wildlife Reserve, Sunsari.
Mr. Amir Miya	Driver

We were mostly same team members who were involved in previous research work (13977-1 and 20338-2). We have three co-investigators viz. **Mr. Prabin Shrestha** and **Mr. Nabin Kumar Yadav** and **Miss Binita Khanal**. Similarly, **Dr. Kamal Gaire** (Senior Livestock officer) was also involved in this project for capturing and collaring elephants.

**Mr. Shrestha** has completed his M.Sc. in Natural Resource Management and Rural Development from Institute of Forestry, Pokhara Nepal. He is working as a consultant (Climate Change) under local development Ministry of Nepal. He also has an experience of working on elephant ecology, snow leopard survey and vegetation analysis.

**Mr. Yadav** has completed his M. Tech in Remote sensing and GIS from Indian Institute of Remote sensing. He is currently a forest officer of GON. Previously, he had worked as Remote sensing and GIS Analyst in International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal. He had been involved in reviewing new approaches for satellite image processing including high resolution optical and SAR images, Satellite image processing related to assigned study/theme and different time series data processing on weather and climate and spatial-temporal analysis of weather and climate data, Land use/land cover classification using satellite data. He has sound knowledge of handling GIS and remote sensing and habitat analysis work using Arc GIS and R program.

**Ms. Khanal** has an undergraduate degree in forestry with nearly 5 years of combined experience in the field of biodiversity conservation, climate change, and data analysis and management. She is a freelancer having sound knowledge of elephant ecology and statistics. Similarly, PI worked with Mr. Shrestha for conducting fieldwork, whereas, with Ms. Khanal and Mr. Yadav for data entry and analysis, preparing maps and modelling work. We together furnished out project work with the scheduled time frame.

**Mr. Kamal Gaire** has long been involved in wildlife veterinary program in Chitwan National Park. He has long experience of using drugs for handling, capturing and collaring Elephants, tiger, Rhino and many other species. Side by side, the NTNC technicians having long experience of darting and handling wildlife will be used under the leadership of **Dr. Kamal Prasad Gaire** (Senior Livestock officer) of DNPWC with dart guns, drugs and Kunki with their crews and security staffs.

## 12. Any other comments?

We have selected 13 RRT and two CBAPOs for sensitising them about the human-elephant coexistence. We had successfully conducted the training and about 457 people benefitted from this training. Side by side, we had also sensitised five eco-clubs, two District Teachers Networks, 13 buffer zone user committees (BZCFUGs) and five community forest user group (CFUG) for sensitising about the project and human-elephant conflict mitigation measures.

All these participants were participated in the training and they have learned about elephant behaviour and elephant handling method for reducing human-elephant conflict. After completion of the training, we have mobilised teachers' networks and eco-clubs and other resource persons for conducting conservation education classes in the 17 secondary level schools, where 1973 students were benefitted along with 240 teachers. These events were very successful and other schools were also asking for school kids' education.

We have provided the spot lights, hand mikes, fuel and refreshment cost to the 13 RRTs and two CBAPOs to deter problematic elephants and help to remove from the settlement to reduce the human-elephant conflict and they were working very well resulting 50% reduction in human-elephant conflict. Similarly, teachers' network and eco-clubs were provided grants for conducting conservation education classes and radio programme from Radio Narayani FM Birgunj to conduct Save the Elephant radio

programme. We had found that human-elephant conflict is most serious outside the protected areas and need to focus on that. We had found eight elephants severely injured by gun shot and spears. Three to five elephants were electrocuted each year outside protected areas and poaching incidents also escalated. So, there is an urgent need to initiate community-based conservation awareness activities for preparing a conducive environment for human-elephant coexistence.

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