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### **Factors Influencing Human Wildlife Conflict in Communities around Protected Area - The Case of Koshi Tappu Wildlife Reserve in Eastern Nepal**

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#### **ABSTRACT**

Background: Koshi Tappu Wildlife Reserve (KTWR) located in eastern development region of Nepal is the main habitat of several wildlife including wild elephants, wild buffalos, wild boar etc. Objective: the objective of this study was to identify the factors associated with park-people conflict and assess their impacts on managing relationships between park-people. Methodology: the study followed descriptive as well as analytical cross-sectional research design and covered 300 individuals from the study site. The data were analysed by using descriptive and inferential statistics such as frequency table, cross tabs and chi-square. Results: This study has revealed the intricate relationship between the local people and wildlife and analysed a number of factors associated with them. The factors such as crop damage, depredation of livestock, increased population, resentment arising from reserve regulation, poor relation with protection units, illegal fodder collection, lopping of trees, injury by wild animals, security of park-people, unmanaged sight-seeing activities operated by tour organizations or self, illegal grazing and use of land of park by the local community are negatively affecting this relationship. Conclusion: The study found that the relationship between park and people is negative and there was significant association between the perception of respondents on all the issues such as crop damage, illegal fodder collection, lopping of trees, injury of wild animals, security, illegal grazing, unmanaged sight-seeing and use of land.

**KEYWORDS:** Conflict, Koshi Tappu, Park-People, Human – Wildlife

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## **INTRODUCTION**

Local people get a lot of benefits through the wildlife, but at the same time they also affect on the survival of the wildlife. Interaction of large mammals and people takes place for a niche or their place in the ecosystem. Conflict is a negative interaction which takes place between different animals involving humans too. Interaction of large mammals and local people may be both positive and negative. Negative interaction or conflict takes place due to the competition between the park and people. Crop damage, livestock loss and local harassment by wild elephants, wild buffalo, deer, boars, tiger and leopard may be the main problem. Because of wildlife, protected areas are established which attract tourists which in turn help in creating employment and raising economic growth. Economic benefits of select ecosystem services of the Koshi Tappu Wildlife Reserve are estimated at around USD 16 million each year<sup>1</sup>.

Protected area management faces many challenges such as park–people conflicts including crop damage by wildlife, human injury and death caused by rogue wildlife, livestock losses, and displacement of local communities from their own area. These problems often intensify when local people live in a close association with protected areas<sup>2</sup>. Habitat destruction, population pressure and food shortage are exerting tremendous pressure on the natural resources of Nepal.

Conservationists throughout the world realize that protected areas are not secured without active support of local communities. Park-People Conflict is one of the major problems in almost all the protected area of Nepal. Most of the protected areas in Nepal legalized after the World War II and people in or near the protected areas were using the local natural resources from time immemorial. They were free to collect firewood, fuel wood, timber, fodder and thatch grass from the forest and were dependent upon it for grazing and fodder for the livestock, bamboo and medicinal plants for their livelihood and fishing and hunting. With the enactment of such area as national park, local people were legally barred to use the local natural resources which in turn instigated the series of park-people conflicts in and around protected areas in Nepal.

Many of the conflicts that take place in and around park are of human origins. Conflict causes severe damage to park resources and jeopardize the fate of wildlife. The restriction imposed on the resources used by the local people to meet their basic need lead to deterioration of the park people relation<sup>3</sup>. Crop damage by wild animals, livestock killing, injury by wild animals, poor relation with

protection units, illegal fodder collection and lopping of trees, illegal grazing, timber theft, poaching etc are major issues raising the conflict between the park and people.

The study area i.e., Koshi Tappu Wildlife Reserve (KTWR) is a small reserve, with a total area of 175 sq.km, while an additional 173 sq.km, including adjoining highly populated villages, as a buffer zone. It encompasses 16 Village Development Committees with a population of 93,000 from 16,280 households, was established as a buffer zone to reduce conflicts between the Reserve and local people. About 87% of local families depend on agriculture for their livelihood; only 20% of households are food secure. Livestock density stands at 1.5 cattle per household<sup>1</sup>. The area has subtropical climate with maximum temperature in May and maximum rainfall in July. It is mainly characterized by extensive wetland habitats in the form of floodplains, oxbow lakes, and swamp forests. The terrestrial vegetation consists of grassland savannah as well as small areas of degraded forest<sup>4</sup>.

The livelihoods of most of the economically active population in the buffer zone are derived from agriculture and natural resource use. Since the KTWR was established, conflicts have arisen between the local communities and the utilization of the park's land and natural resources. Studies have shown that the affected population is hostile to the park because of relatively serious crop depredation from wildlife<sup>1</sup>.

The main objective of this study was to assess various factors associated with the park-people conflict prevailing in Koshi Tappu Wildlife.

## **MATERIALS AND METHODOS**

Although, the study followed mainly the quantitative research methods, it also applied qualitative research method as descriptive research methodology particularly to explore the attitude and opinion of the respondents. The study has identified various determinants of park-people conflict.

The study was carried out in three districts (Sunsari, Saptari and Udayapur) adjoining to the wildlife reserve. Various criteria such as representation of ecological as well as ethnicity have been considered while selecting these VDCs. The study was based on the response of 22 leading experts and practitioners from Kathmandu Valley and 300 individuals from the study site namely KTWR area. Thus,

altogether, the study included 322 respondents. A number of questionnaires were developed for different groups with specific questions. Various research methods such as observation, questionnaire survey, interview etc. were applied for this study. The data were analyzed by using SPSS. The study was based on descriptive as well as analytical so researcher mainly analyzed through the crosstab and chi-square test.

## **RESULTS**

In total 300 respondents; 50% respondents participated from the Saptari district followed by 33.3% from the Sunsari and 16.7% from the Udayapur district. Among them, 43% people belonged to Madhesi caste, 27% Janjati (ethnic), 16% Dalit, 9% Brahmin/Chhetri and 4.7% Muslim. Educational status shows that majority (32%) were illiterate followed by 30.3% literate, 13.7% were primary level, 10% had lower secondary level education and 13% had higher secondary and above. The data show that higher numbers of illiterate and literate people were living around the reserve area of Koshi Tappu.

Park-people conflict or the negative interaction between people and wildlife is one of the main issues of wildlife management. This study revealed that KTWR is facing a number of park-people related problems; many of them were induced by local people and some by wildlife. However, even the problems arose from wildlife are one way other are related to human. Some of the major problems are as follows:

- Crop damage
- Depredation of livestock
- Increased population
- Resentment arising from reserve regulation
- Poor relation with protection units
- Illegal fodder collection
- Lopping of trees
- Injury by wild animals
- Security of park-people
- Unmanaged sight-seeing activities operated by tour organizations or self
- Illegal grazing
- Use of land of park.

These problems were analysed in detail and presented below.

***Crop damaged by wild animals***

Researchers asked the local people regarding the causes of conflict between the park and people living around the park. The damage of crops by wildlife is one of the majors problems in the area.

**Table No. 1: Crop damaged by wild animals**

		Address of respondents			Total	
		Udayapur	Saptari	Sunsari		
Crop damage	Strongly Agree	Count	46	144	47	237
		% of Total	15.5%	48.6%	15.9%	80.1%
	Agree	Count	0	4	41	45
		% of Total	0.0%	1.4%	13.9%	15.2%
	Neutral	Count	0	1	4	5
		% of Total	0.0%	0.3%	1.4%	1.7%
	Disagree	Count	0	0	5	5
		% of Total	0.0%	0.0%	1.7%	1.7%
	Strongly Disagree	Count	3	0	1	4
		% of Total	1.0%	0.0%	0.3%	1.4%
	Total	Count	49	149	98	296
		% of Total	16.6%	50.3%	33.1%	100.0%

Sources: Field survey, 2014

More than 80% respondents reported strongly agree in the statement that crops damage was one cause of park-people conflict followed by 15.2% agreed on the same statement. As from the demographic data, it was found that around 94% household produce paddy and wheat as the main crops of farming. Their daily expenditure was managed by agricultural production so crops damaged by wild animals brought food insecurity problem to them. From the personal interview also, many respondents said that crops damaged by wild animals was the main problem of communities because they were not getting any compensation from any authorized agencies.

***Resentment towards reserve regulation***

Regarding the opinion towards the rules and regulation of reservation office, around 55% respondents agreed that because of the unfavourable regulation of government towards the victim of wild life brought the conflict between the park-people.

**Table No. 2: Resentment towards reserve regulation**

		Address of respondents			Total	
		Udayapur	Saptari	Sunsari		
Resentment towards reserve regulation	Strongly Agree	Count	23	52	8	83
		% of Total	7.9%	17.9%	2.8%	28.6%
	Agree	Count	0	65	13	78
		% of Total	0.0%	22.4%	4.5%	26.9%
	Neutral	Count	1	28	27	56
		% of Total	0.3%	9.7%	9.3%	19.3%
	Disagree	Count	0	3	32	35
		% of Total	0.0%	1.0%	11.0%	12.1%
	Strongly Disagree	Count	24	0	14	38
		% of Total	8.3%	0.0%	4.8%	13.1%
	Total	Count	48	148	94	290
		% of Total	16.6%	51.0%	32.4%	100.0%
<b>Chi-Square Tests</b>						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		193.502 <sup>a</sup>	8	.000		

Sources: Field survey, 2014

Among 290 responses, 28.6% reported strongly agree followed by 26.9% agree that resentment arising from reserve regulation is one cause of park-people conflict. Around 25% respondents were not agreed on it followed by 19.3% were found in neutral response. Regarding the resentment towards the reserve regulation, respondents said that government does not have clear rules to provide the compensation for victim of wild life. From the respondents' point of view, government had only provided compensation to that victim whose family member was killed from the attack of wild animals otherwise no compensation found for crops damage.

Problem of crops damaged was reported high. From the primary data of annual production, it was found that annually community people produce the crops equal to NRs, 10000-2500000. Mean production was NRs. 146128.47. Similarly, total loss in a year due to crop damage by wild animals was NRs. 2000-500000. Mean loss was NRs. 30644.10. One individual had to bear minimum 2000/- to 500000/- rupees. It is amount for already poverty-stricken local farmers but there was no provision of

compensation. So, resentment towards the regulation of authorized agencies becomes one of the major issues of conflict.

There was significant association ( $p=.000$ ) found between the perception of respondents on the issue that resentment arising from reserve regulation was one cause of park – people conflict.

### Poor relation with protection units

Following table clearly shows the relationship between protection units and community people.

**Table no. 3: Relation between protection units and community people**

		Address of respondents			Total	
		Udayapur	Saptari	Sunsari		
Poor relation with protection units	Strongly Agree	Count	6	82	4	92
		% of Total	2.1%	28.4%	1.4%	31.8%
	Agree	Count	0	37	12	49
		% of Total	0.0%	12.8%	4.2%	17.0%
	Neutral	Count	1	16	21	38
		% of Total	0.3%	5.5%	7.3%	13.1%
	Disagree	Count	0	9	26	35
		% of Total	0.0%	3.1%	9.0%	12.1%
	Strongly Disagree	Count	40	0	35	75
		% of Total	13.8%	0.0%	12.1%	26.0%
	Total	Count	47	144	98	289
		% of Total	16.3%	49.8%	33.9%	100.0%
<b>Chi-Square Tests</b>						
		Value	df	Asymp. Sig. (2-sided)		
Pearson Chi-Square		214.190 <sup>a</sup>	8	.000		

Sources: Field survey, 2014

Regarding the relation between the protection unit of park and community people, in total 31.8% strongly agree that poor relation with protection unit was one cause of park-people conflict followed by 17% agreed on the same. But more than 50% respondents were found disagree and neutral because such situation was varied in district wise. From the field observation and face to face interview with community people, it was found that relation between protection units and community people was comparatively good in Sunsari district than the Saptari and Udayapur.

There was significant association ( $P=.000$ ) found in perception of respondents of all three districts regarding the relation between protection units and community people.

**Lopping of trees**

From the informal discussion with park authorities regarding the current issue of park-people conflict, it was informed that cutting of trees and illegal grazing into the reservation area was one problem. So, same issue was asked with community people also.

**Table No. 4: Lopping of trees from reservation area**

		Address of respondents			Total		
		Udayapur	Saptari	Sunsari			
Lopping of trees	Strongly Agree	Count	8	95	36	139	
		% of Total	2.7%	32.6%	12.4%	47.8%	
	Agree	Count	0	41	27	68	
		% of Total	0.0%	14.1%	9.3%	23.4%	
	Neutral	Count	0	1	16	17	
		% of Total	0.0%	0.3%	5.5%	5.8%	
	Disagree	Count	2	11	12	25	
		% of Total	0.7%	3.8%	4.1%	8.6%	
	Strongly Disagree	Count	38	0	4	42	
		% of Total	13.1%	0.0%	1.4%	14.4%	
	<b>Total</b>		Count	48	148	95	291
			% of Total	16.5%	50.9%	32.6%	100.0%
<b>Chi-Square Tests</b>							
		Value	df	Asymp. Sig. (2-sided)			
Pearson Chi-Square		233.434 <sup>a</sup>	8	.000			

Sources: Field survey, 2014

In total, 47.8% were found strongly agree that lopping of trees was one cause of park-people conflict followed by 23.4% agreed on the same issue. Around 30% respondents disagreed on this issue because cutting of trees from reservation area is illegal activity so in some cases, some of the respondents hesitated to disclose such activities also. This issue was also different in district wise. This problem was found high in Saptari district than Sunsari and Udayapur.



Although, there was significant association ( $p=.000$ ) found between the perception of respondents on the issue that lopping of tree was one cause of park – people conflict.

### ***Injury by Wild Animals***

From the field survey, it was found that 98.66% respondents opined wild elephant as the most destructive for them followed by 94.66% to wild buffalo and 75.33% to wild boar. According to the community people, almost every month they had to face some kind of attack from the wild animals. During the attack of wild animals, people mainly old, women and child become more vulnerable to injury which was one main cause of park-people conflict.

**Table No. 5: Injury by wild animals**

			Address of respondents			Total	
			Udayapur	Saptari	Sunsari		
Injury by wild animals	Strongly Agree	Count	39	122	9	170	
		% of Total	13.4%	42.1%	3.1%	58.6%	
	Agree	Count	3	24	43	70	
		% of Total	1.0%	8.3%	14.8%	24.1%	
	Neutral	Count	0	1	19	20	
		% of Total	0.0%	0.3%	6.6%	6.9%	
	Disagree	Count	0	0	17	17	
		% of Total	0.0%	0.0%	5.9%	5.9%	
	Strongly Disagree	Count	6	0	7	13	
		% of Total	2.1%	0.0%	2.4%	4.5%	
	<b>Total</b>		Count	48	147	95	290
			% of Total	16.6%	50.7%	32.8%	100.0%
<b>Chi-Square Tests</b>							
		Value	df	Asymp. Sig. (2-sided)			
Pearson Chi-Square		171.206 <sup>a</sup>	8	.000			

Sources: Field survey, 2014

Regarding the injury of people, 58.6% respondents strongly agreed that injury by wild animal was one cause of park-people conflict and 24.1% agreed on the same issue. 20% respondents were found in neutral response and 17% disagreed on this issue. This may be because of the self-protection and compensation by government to injured people.

There was significant association ( $p=.000$ ) found between the perception of respondents on the issue that injury by wild animal is one cause of park – people conflict.

### Security of park-people

Most of the people of park areas said that there was presence of police and reservation office but the security system was not adequate to protect community people from the attack of wild animals. They said that protection units became available only when community people informed them about the attack of wild animal. According to the community people, there were no any proper prevention measures to control the attack of wild animals.

**Table No. 6: security of people**

			Address of respondents			Total	
			Udayapur	Saptari	Sunsari		
Security of people	Strongly Agree	Count	1	17	14	32	
		% of Total	0.3%	5.7%	4.7%	10.8%	
	Agree	Count	0	48	13	61	
		% of Total	0.0%	16.2%	4.4%	20.6%	
	Neutral	Count	0	55	18	73	
		% of Total	0.0%	18.6%	6.1%	24.7%	
	Disagree	Count	0	28	25	53	
		% of Total	0.0%	9.5%	8.4%	17.9%	
	Strongly Disagree	Count	48	0	29	77	
		% of Total	16.2%	0.0%	9.8%	26.0%	
	<b>Total</b>		Count	49	148	99	296
			% of Total	16.6%	50.0%	33.4%	100.0%
<b>Chi-Square Tests</b>							
		Value	df	Asymp. Sig. (2-sided)			
Pearson Chi-Square		198.789 <sup>a</sup>	8	.000			

Sources: Field survey, 2014

Regarding the security of community, around 43% respondents were found disagree on the issue that security of people living around the park areas was one issue of park-people conflict. Similarly, 31% agreed on the same issue. Their experience was different in district wise. In Sunsari district, there was provision of solar fence (electric wiring around the community) to control the entry of wild animals

into the community but such provision was not properly implemented in Saptari and Udayapur districts. So, people of Sunsari district felt some secure than in other district.

In general, security of people was one main issue of conflict so there was significant association ( $p=.000$ ) found between the perception of respondents of all three districts regarding the security of people as one issue of park-people conflict.

### *Use of land of park*

It was interesting to discuss about the use of land of park. In the individual question, 96.7% said that they had not used land of park followed by 3% had no response. Only 1% reported that they had used the land of park for cultivation. On the other hand, park authority claimed that community people had used the land of park.

**Table No. 7: Use of land of park**

			Address of respondents			Total	
			Udayapur	Saptari	Sunsari		
Use of land of park	Strongly Agree	Count	3	90	4	97	
		% of Total	1.0%	30.7%	1.4%	33.1%	
	Agree	Count	0	41	14	55	
		% of Total	0.0%	14.0%	4.8%	18.8%	
	Neutral	Count	1	4	37	42	
		% of Total	0.3%	1.4%	12.6%	14.3%	
	Disagree	Count	0	11	28	39	
		% of Total	0.0%	3.8%	9.6%	13.3%	
	Strongly Disagree	Count	45	1	14	60	
		% of Total	15.4%	0.3%	4.8%	20.5%	
	<b>Total</b>		Count	49	147	97	293
			% of Total	16.7%	50.2%	33.1%	100.0%
<b>Chi-Square Tests</b>							
		Value	df	Asymp. Sig. (2-sided)			
Pearson Chi-Square		324.157 <sup>a</sup>	8	.000			

Sources: Field survey, 2014

The data (Table no. 7) shows that 33.1% respondents opined “strongly agree” followed by 18.8% “agree” that use of land of park was one cause of park-people conflict. Around 14.3% and 13.3% respondents were neutral and disagree respectively on the same issue.

The data revealed that there was practice of use of land of park by community people. There was significant association ( $p=.000$ ) found between the perception of respondents on the issue that use of land was one cause of park – people conflict.

## **DISCUSSIONS**

This study revealed that in Koshi Tappu Wildlife Reserve wild elephants, wild buffalo (*Bubalus bubalis*) and wild boar (*Sus scrofa*) are the main crop raiders. This study found out that several problems are responsible to instigate conflict between park and people.

The present study’s findings show that wild buffalo and wild boar are the major crop raider. Wild elephants, wild buffalo preferred to eat paddy and wheat whereas wild boar was found to eat wheat and potato. The heavy trampling in the farmland also destroy crop. The findings suggest that more than 80% respondents strongly agreed that crops damage was one major cause of park-people conflict. In this reserve another study has shown that wild buffalo and wild boar were responsible for damaging 85.15 % and 14.84% crop respectively<sup>5</sup>.

People living near the forest or protected area considers wildlife a cause for the loss of their crops and other properties. They also report destruction caused by wildlife and ask for compensation from the government. In Koshi Tappu area, crop damage by wild buffalo, crop raiding by spotted deer and elephant is most frequent. A study carried out by<sup>6</sup> identified langur and macaques monkeys as troublesome wildlife since they caused considerable damage to the crops. In another study carried out in terai region<sup>7</sup> explained that the probable cause of the conflict was the increasing population of elephant.

It is clear that there is no single approach that will guarantee the coexistence of large carnivores with people. There is variation in habitats, availability of prey, patterns of land-use and animal husbandry, and people’s attitudes towards large carnivores<sup>8</sup>.

Niche is an organism's habitat or a location in the ecosystem. It is an organism's pattern of use of its habitat. It can also be thought of as the functional role, or job, of a particular species in an ecosystem. Presence of human settlements around and within protected areas is often detrimental to the life of wild species. The study has clearly indicated that the park – people relationship is affected by a number of factors. In some cases, impact of local people in the wildlife is quite high and there is also loss of human life and property because of the wildlife.

The factors of park-people conflicts as reported by<sup>1</sup> are related to deforestation, wildlife poaching, illicit loggings, uncontrolled bush fires, shifting cultivation and over –grazing are also prevalent in the KTWR area. This study realizes that park-people problems are ubiquitous and can be managed by involving local community in decision-making. As the Koshi Tappu Wildlife Reserve is specially designated for Asian wild buffalo conservation<sup>9</sup>, efforts should be made to maintain the park-people relationship considering the importance of wild buffalo and other species in this reserve.

## **CONCLUSION**

This study has identified a number of factors associated with park-people conflict in KTWR which are jeopardizing the state of this reserve since they are negatively influencing the human and wildlife relationships in an around the protected area. Factors such as crop damage, depredation of livestock, increased population, resentment arising from reserve regulation, poor relation with protection units, illegal fodder collection, lopping of trees, injury by wild animals, security of park-people, unmanaged sight-seeing activities operated by tour organizations or self, illegal grazing and use of land of park by the local community are the major factors which are challenging the management of protected areas and maintaining the intricate relationship between park and people.

The study revealed that the impacts of negative effects because of the park-people interaction as data show that there was significant association between the perception of respondents on all the issues such as crop damage, illegal fodder collection, lopping of trees, injury of wild animals, security, illegal grazing, unmanaged sight-seeing and use of land.

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