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**Ram Chandra Adhikari**

Lecturer, Department of  
Zoology, Tribhuvan University,  
Post Graduate Campus  
Biratnagar, Province 1, Nepal

## Anthropogenic impacts on Koshi Tappu Wetland, a Ramsar site of Nepal

**Ram Chandra Adhikari**

### Abstract

Koshi Tappu Wetland/Wildlife Reserve is the first Ramsar site and only the Wildlife Reserve of Nepal. This study of one year long was launched to find out major anthropogenic impacts to wetland/reserve. Field visit, direct observation, questionnaire and interview methods were applied. 60% houses' roof, 76% walls were made by Kans. 89% people belong to agriculture, 98% people of the settlements go to the wetland for some purposes - 90% for fire wood, 89% for grass and fodder, Niguro picking 43%, fishing 48.1%, Kans collection 97.83%, for farming 17%, *Typha* harvesting 55.83%, mud collection 62.67% and shoot collection 33.5%. Each household had kept 5.2 number of cows and 5.1 buffaloes 84% of which let free in the wetland. The main source of energy was firewood, 87%. For the livelihood 98% of local people depended on the wetland. Only 3.11% fisherman used hooks. The farmer used maximum amount of inorganic fertilizers and pesticides. 412 picnic groups /yr arrived. 89% of events of wildlife people conflict were from the side of human. 71% of the owners of domestic buffalo had purposed to the made cross with the wild water buffaloes to improve meat quality in the breed. People put on fire with the main aim (71%) for the better growth of grasses.

**Keywords:** Fishing, pesticides, kans, livestock, elephant

### Introduction

Koshi Tappu wetland/ wildlife reserve is situated between the coordinates of 26° 56' -26° 40' and 85° 56'-87° 04' in the floodplains of the Koshi river. The elevation ranges from 75m to 81m asl with a total area of 175 square kilometers and a buffer zone of 173 square kilometers [1]. It was established in 1976 as Wild Life Reserve with the main objective to protect the last population of the Asiatic Wild Water Buffalo (*Bubalus arnee*) in Nepal.

It has been enlisted as the first Ramsar site of Nepal on 17th December 1987 [2]. It is the wetland with the edges Sunsari district in East, Saptari and Udaypur in the west and Udaypur in North and Koshi Barrage, the boarder of India in South. It comprises extensive mudflats, reed beds, and freshwater marshes in the floodplain of the Saptakoshi river. The major habitats include wetlands, grasslands, and small patches of the Riverine forest [3].

It is important to locals because this reserve prevents the pristine riparian wetlands, cattail fields, mudflats, grasslands, forests, marshes and swamps, lakes and ponds, and excavated ponds also. Although, the Koshi Tappu Wildlife Reserve is the smallest protected area in the Terai belt of the country, the reserve is very rich in the floral and faunal diversity and it is only the Wildlife reserve too [4].

The maximum temperature recorded up to 40 °C. Humidity remains high all year round with the monthly average 76% - 94%. The average annual rainfall is 2019 mm. [5]. About 68% of the Reserve is occupied by the plain grasses while only 6% is covered by the forest [6]. The reserve is also home to 31 species of mammals, 200 species of fishes and 23 species of herpetofauna. Reserve is the habitat for 15 globally significant species. Eight wild elephant reside there permanently for 10 years [7]. There are wild water buffalo (219 nos.), dolphin (11 nos), marsh mugger crocodiles (5), 52 to 74 Swamp francolin and vultures (517) [8]. There are 485 bird species of birds recorded [6]. The globally threatened 17 number Bengal Floricans are also present [9]. There are 33 ecosystem services of wetland and reserve area. The economic benefit of Koshi tappu wetland is about 16 million Us Dollars per year [10].

The number of tourists is not so less. In the fiscal year 2016/17, 11252 persons came to visit. About 63.6 percent respondents felt uniqueness of that site. For the conservation 9 buffer zone committee, 425 sub-committee and 269 community based organization are working [11]. Wetland ecosystem services are part of livelihood of people living there. If the ecosystem

**Corresponding Author:****Ram Chandra Adhikari**

Lecturer, Department of  
Zoology, Tribhuvan University,  
Post Graduate Campus  
Biratnagar, Province 1, Nepal

service is not properly conserved and managed the relation of nature with the people will conversely affect the sustainability of the wetland [12].

Thousands of locals enter in to this protected area daily for the collection of firewood, fodder etc. Totally the livelihood also bases on the wetland. So many visitors, livestock,

fishermen, other local people enter here in, not only this even from India the domestic buffalo are brought for the cross breeding with wild water buffaloes. These all the activities certainly affect the wetland habitat. This study focused on the mentionable impacts by the human activities.

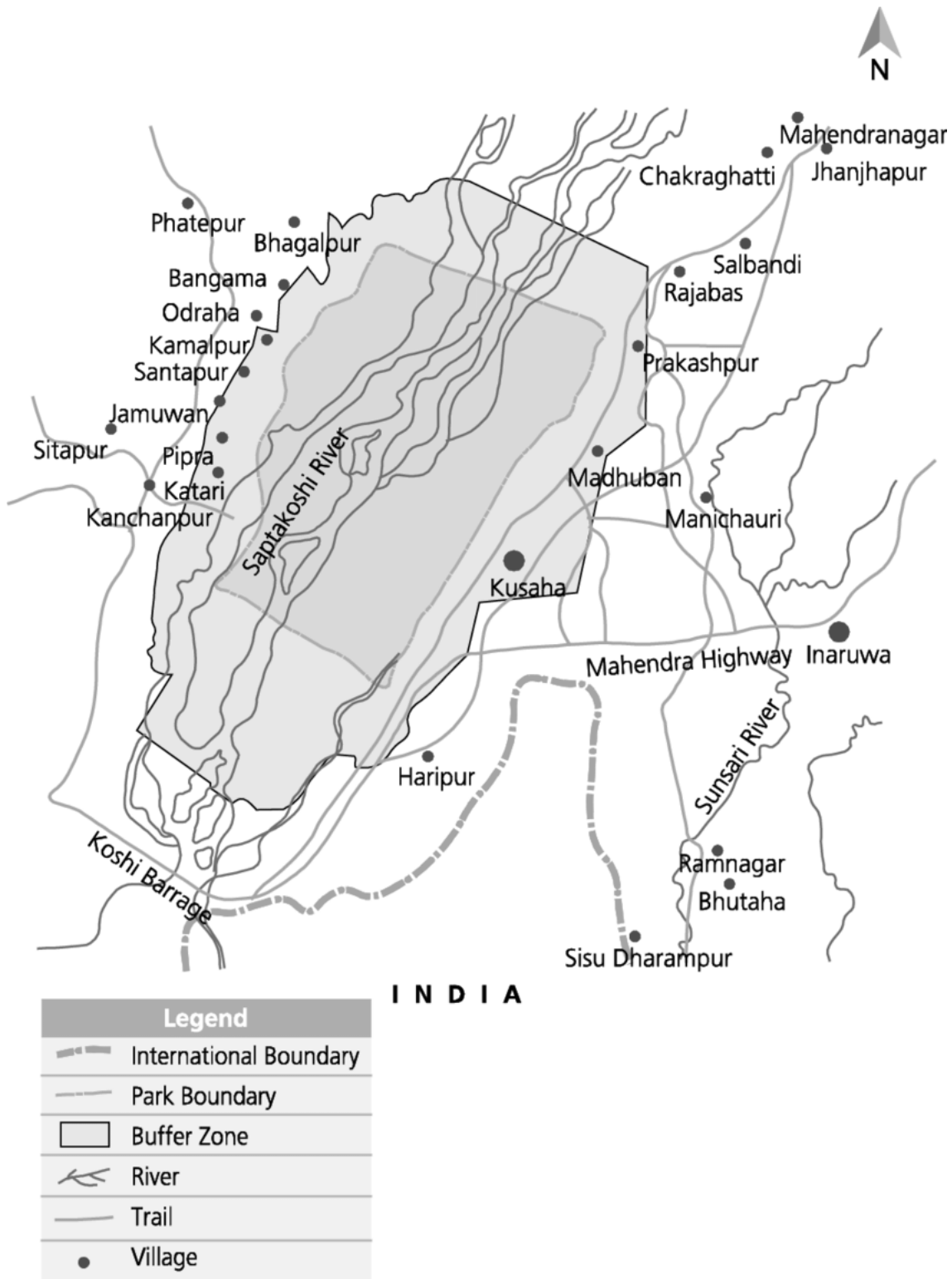


Fig: Map of Koshi Tappu wetland/ wildlife reserve.

**Objectives**

The objective the research work is as follow

1. To explore livelihood of local people on Koshi tappu wetland /reserve
2. To find out the activities of people which harm the

ecosystem of wetland

3. To identify the relation of livestock with wild animal specially with wild buffalo.

## Materials and Methods

The study was carried out from January 2018 and closed in January of the year 2019. The following methods were used to get the result.

### Field visit

To be familiar with the locals and to know about the locality firstly frequently, later regularly field visits were made. Not only this to collect the information from all sides of the wetland/reserve some locals were also mobilized. The researcher stayed there for most time of the research period.

### Closed and opened questionnaire

To collect the required information questionnaire are prepared. Some questions were closed means only to write yes or no or single word or only to give tick mark. Some understand detail answers.

### Interview with local people

To know their harmful activities a short interview was run in different places. 10 skill full manpower who know the locality and the local language selected. They visit the settlement frequently according to the objective of research. With the guidance of secondary data of local governments the number of households determined and counted belonging to the wetland. The respondents were sampled randomly about one third of the total count.

### Direct observation and counting of livestock

Census was applied to the total count of live stocks which

enter and exit daily. And, by the interview with reserve authority and locals the data of residential cattle were collected. For the direct count 16 ways (spots) were determined and in the morning and evening for few months counting was continued. It was done by the help of trained persons.

For finding the relation of domestic livestock with the wild water buffalo interview and direct observation were applied.

## Results and Discussions

### a. Settlements

Total number of settlements of human was found as 250 including all three districts Sunsari, Saptari and Udaypur at the vicinity of Koshi Tappu. The settlements locate on Barah Kshetra municipality on the East and North, Koshi rural municipality on the south and East (Sunsari), Kanchanrup and Saptakoshi municipality (Saptari) on the west and Belaka municipality, Tapeshwari (Udaypur) in West and North of the wetland.

The number of households in the adjoining area including buffer zones was found as 1800 and total population of adjoining settlement was about one lakh 14 thousands. The previous study of NARC there were 215 settlements, 16 VDC and 108 wards. In the buffer Zone area there are 1400 households and 93,300 people<sup>[13]</sup>.

### b. Types of houses

Depending on the constructional materials the houses were found as following kinds.

**Table 1:** Constructional materials on the parts of houses

S. N.	Part of houses	Construction materials	Percentage	Remark
1.	Roof	Grass/ straw/ Ass (Khar /Kans)	60%	
2.	Roof	Tin sheet	32%	
3.	Roof	Mixed	5%	
4.	Roof	Others	3%	
1.	Wall (Bera)	Grass/straw/Ass (Khar/Kans) and mud	76%	
2.	Wall (Bera)	Bamboo and cement	12%	
3.	Wall (Bera)	Bricks	4%	
4.	Wall (Bera)	Others	8%	

The above table shows majority of the house roof was made by Khar also called wild sugarcane. The Khar/wild sugarcane (*Saccharum spontaneum*) was collected from wetland area. Similarly the boundary or wall or Bera was mostly constructed by Khar. The ultimate source of this material was wetland. A huge amount about five quintals of sugarcane was collected per household per annum.

Dangi predicted that if consumption practice of wild sugarcane continues the flood on the river over flows and damages the wetland and human's residents too. Not only this, while the people remain on the grass field they involve on the illegal activities regarding with the wetland and wildlife<sup>[14]</sup>.

### c. Profession of respondents

The following observation was taken during the study.

**Table 2:** Profession of respondents

S.N.	Profession	Percentage	Remark
1.	Agriculture	89%	
2.	Labor in industry and agriculture	2%	
3.	Job, business and others	7%	

Since majority of respondents, 89% were farmers, their relation established with the wetland. They collected dung and other compost from wetland. They made the compost from vegetation of reserve/wetland. Only few local people were involved to the other jobs. NARC reported about 87.3% were farmers. The farmer have been modifying the wetland for the cultivation<sup>[13]</sup>.

Since higher percentage of population engaged in the agriculture demand for the modification of wetlands to agricultural land, particularly rice fields, will continue to increase, placing additional pressure on wetlands and their fish stocks<sup>[15]</sup>. Of 163 wetlands of Terai inventoried by IUCN in 1978, 43 percent had suffered from some degree of drainage. Much of this farmers reduces the ground water recharge also<sup>[16]</sup>.

### d. Response of the respondents who visit the wetland/ Reserve for some purposes

**Table 3:** Purposes of visiting wetland

S.N.	Going or not	Percentage	Remark
1.	Going to wetland/ Reserve	98%	
2.	Not going to wetland/Reserve	2%	

Almost all the locals went to wetland for some purposes. It might be daily or weekly. Entry of people may harm the wetland and creatures. Not only this it was for the purpose of consumption of resources. Basnet reported that most of the houses lack toilets and there was compulsion to go the wetland. This might grow the eutrophication and algal bloom problem by adding organic manner<sup>[17]</sup>.

**e. Number of reared cattle in the households. Studied not to all household but only in sample taken as random sampling.**

**Table 4:** Number of cattle per household

S.N.	Type of animal	Number per household in Average	Remark
1.	Buffalo	5.1	
2.	Cow	5.2	
3.	Sheep (Terai)	6	
4.	Goat	5	

It was one of the great impact on wetland. Depending on above data the number buffaloes alone was 5.1. Hence total number of buffaloes was 9,180(1800×5.1), the number of cow was 9,360. Those of sheep was 10,800 and goat 9,000. So many domestic animals could't be kept in houses or surroundings. Public released them to the wetland for grazing and resident too.

**f. The rearing of animals are free to graze or kept in fenced or controlled form**

**Table 5:** Type of rearing practice of animals

S.N.	Type of rearing	Percentage	Remark
1.	Let free in the wetland	84%	
2.	Controlled in own field	5%	
3.	In the shed or house	11%	Only babies

Only the babies of cattle were kept on the houses. 84% of lives tocks were let free to the wetland area.

According to IUCN Koshi tappu was the good example of overgrazed and affected wetland. Stocking densities in the area are high at an average holding of 5 animal per household or a density of over 400 animals/ square kilometers. Everyday 15,000 to 20,000 livestock graze the area and 3,000 stocked inside the reserve area. The overgrazing affect the wild water buffalo and other herbivores<sup>[15]</sup>.

**g. Major settlements or sources of livestock going to wetland/reserve**

**Table 6:** Settlements from where livestock going to wetland

S. N.	Settlements/sources	District	Remark
1.	Prakashpur, Madhuban, Paschim Kushaha, Shreepur, Hariipur, Shreelanka and other islands (Tapu)	Sunsari	
2.	Bhardaha, Barmajhiya, Bairwa, Purva Pipara, Ghognapur, Aadraha, Kamalpur	Saptari	
3.	Tapeshwari	Udaypur	
4.	Koshi Barrage	Nepal India border	

The above places were the major villages from where the livestock entered in the wetland area. During this study period the cattle from Indian village were not so common. But one finding pointed that from the south edge of wetland the cattle entry occurs. About 15% of total permanent cattle of wetland was Indian<sup>[13]</sup>.

**h. Source of energy for cooking food and others**

**Table 7:** Sources of energy/fuel

S.N.	Types of energy source	Percentage	Remark
1.	Firewood	87%	
2.	Dung strips/pieces	4%	
3.	Biogas	4.7%	
4.	LP gas	3.4%	
5.	Others	0.9%	

Majority of the people of the vicinity of Koshi tappu wetland depended on the firewood 87%. Some, 4% make dung strips. Only 4.7% of household had constructed biogas plant 3.4% used liquefied petroleum gas for cooking purpose. This shows maximum chances of firewood and timber collection resulting deforestation. IUCN 2004 reported that at koshi tappu 90% of households within the vicinity of reserve collected fire wood (of which 26.3% comes from forest and 16.4% from driftwood collected within the Reserve) 16% of households collect fodder from within the reserve<sup>[15]</sup>. A report projected the data that 80% of people of that district used firewood<sup>[18]</sup>.

**i. Livelihood of people depending on the wetland/reserve**

**Table 8:** Kind of dependency of people on wetland

S.N.	Kind of dependency	Percentage	Remark
1.	Totally on wetland	43%	
2.	Partially	55%	
3.	Not concerned	2%	

The finding was 98% population depend on wetland for the livelihood. While all Nepali people take benefit directly or indirectly from the wetlands, the livelihoods of several communities are based on wetland products or services. Nepal has some 103 ethnic and caste groups<sup>[19]</sup>.

IUCN's report 1998 told that about 20 of these ethnic groups as traditionally wetland dependents<sup>[16]</sup>. Most of the residents of Koshi tappu area still depend on the craft produced from wetland plants (Pater, -*Typha*) as primary source of income<sup>[20]</sup>. Majhi People on the bank of Koshi river totally depend on the river transport and fishing for the livelihood<sup>[21]</sup>. Village profile of Paschim Kushaha VDC also has written that livelihood of 98% of the people of vicinity of Koshi bases on the wetland<sup>[22]</sup>. Total 10.8% of Nepal's population live on the foundation of wetland regarding their livelihood<sup>[23]</sup>.

**j. Activities of people which harm the ecosystem of wetland.**

Single respondent from 600 households were selected randomly but covering all the settlements. It comprises one third of the total households. Single respondent from single household was taken. The following was the finding.

**Table 9:** Harmful activities of people on wetland

S.N.	Activities	Number of respondents	Percentage	Remark
1.	Firewood collection	540	90%	Total 600
2.	Grass and Fodder	534	89%	Total 600
3.	Buds of edible fern(Niguro) collection	258	43%	Total 600
4.	For Fishing	289	48.1%	Total 600
5.	For farming rice and other crops	103	17.1%	Total 600
6.	Collection of Thar/Long Grass/Ass/Wild sugarcane	587	97.83%	Total 600
7.	Harvesting of Pater	335	55.83%	Total 600
8.	Mud collection for cementing the wall	376	62.67%	Total 600
9.	Shoot collection	201	33.5%	Total 600
10.	Hunting/collection of baby animals	Not	Not	Police recorded few cases
11.	Construction of sheds	13	2.1%	Total 600

The above table shows that 90% of the total household collected firewood from wetland. Similarly 89% of the respondents cut and collected the grass and fodder. 43% went to the wetland area for the picking of Niguro, the bud of edible fern. Out of 600, 289 or 48.1% of people were found to the wetland for fishing purpose. On the same way least people (household) had constructed sheds in the wetland area or this much people entered into the area for making shed for their

baby animal and lactating mother animals. Dhital found that on the occasion of Chhath festival the number of shoot collector increases [24].

#### k. Fishing practices

The total of 289 fishermen were come to respond in the field. They replied as following.

**Table 10:** Fishing practices on Koshi Tappu wetland

S. N.	Method of Fishing	Number of Respondents	Percentage	Remarks
1.	Hooking	9	3.11%	
2.	Using poisonous chemicals	11	3.80%	
3.	Using poisonous plants	33	11.41%	
4.	Using current web(jal)/electro fishing	24	8.30%	
5.	By drying the pit	12	4.15%	
6.	Using Normal web(jal)	200	69.20%	

There was the provision that the reserve authority could give permission for fishing only by the use of Normal web (Jal) by taking certain fees. But out of 289 fisherman were entering daily in the wetland area only 200 used so. Some used poisonous chemicals (11), some used poisonous plants (33), some used current jal (24). Some fisherman worked very hard to make the small pit dry. The least number of fisherman was found using hook which is the most appropriate and environment friendly method of fishing. Fishing by webbing also harm the small aquatic creatures. IUCN 2004 reported that the trends of fishing by poisoning was increasing in koshi tappu other wetlands of Nepal. Fishing with the explosive material introduced in Nepal in 1980 [25]. But in Koshi tappu the use of explosive materials was not found. Electro fishing and fishing by poisons w were very common in Ramsar site of Terai of Nepal including Koshi tappu [26].

#### l. Use of inorganic fertilizers and pesticides in agriculture

**Table 11:** Quantity of fertilizers and pesticides used

S. N.	Uea (Kg/ha/yr)	Potas (Kg/ha/yr)	Pesticides (Kg/ha/yr)	Remark
1.	211	84	0.13	

On the agricultural field in and around of the reserve or wetland area the amount of inorganic fertilizer and pesticides estimated. It was 211 kg urea /ha/yr. Similarly potas 84 kg/ha/yr was observed. The average of urea used eastern Terai of Nepal was 390 kg/ha/yr and potas 120 kg/ha/yr [27]. Pesticides used in Nepal annually 0.14 kg/ha was also reported by Adhikari, 2018. Major item of pesticide were fungicides,

48%. It was estimated that 1.15 million tonnes of chemical inorganic fertilizers dumped in Ganga River system annually [15]. According to the next data, 61% of terai wetlands were severely affected by the pesticide mixed agricultural outflow [16]. In koshi tappu wetland area there was the most dangerous condition of algal bloom and eutrophication [20]. The consumption of pesticides in Nepal and India is increasing every year. About 2,600 tonnes of pesticides is dumped in Ganga river system annually [15]. APP told that the rapid accelerated condition of agro chemical use [28].

#### m. Picnic activity

**Table 12:** Number of picnic group in the wetland

S. N.	Type	Number	Percentage	Remark
1.	Picnic with Music and cook	96	76.8%	Total 412 team
2.	Dry and calm picnic	29	23.20%	

During study period, the picnic groups were found only in winter seasons (December, January and February), 412. Of course the noise of the music harms the birds and other animals. In accordance with the reserve authority and local people, the number of picnic team is increasing in the later years. In the other spots of the same locality, for example, Betana of wetland daily 100 picnic team stay there [29]. There were the mentionable disturbances in wildlife.

#### n. Observation of wildlife

During the study period the wildlife was observed as in the following pattern.

**Table 13:** Disturbance of picnic to wildlife

S. N.	Point of observation	Birds at picnic time (no. of spp)	Birds at other time (no. of Spp)	Remark
1.	Prakasapur	89	123	
2.	Paschim Kushaha	76	130	

The above table shows that at one important bird watching spot, Prakasapur, only 89 species of birds were observed even in the season of arrival of migratory foreign birds. There was main reason that the picnic (in the months of December to February). But on the same spot 123 species of birds were seen in the seasons other than picnic season. At the next point Paschim Kushaha 76 species of birds were watched in picnic season but in other seasons 130 species observed. Hence picnic has established as a major factor to disturb the bird.

The number of migratory birds flocking to the Koshi Tappu Wildlife Reserve (KTWR) and its surrounding wetlands is decreasing for some years owing to various factors. The 55 to 100 species of migratory birds recorded to have arrived in an astonishing number in the Reserve with the onset of winter in

the past lately are not seen visiting the place in the similar number. The decreasing number of such winter visitors has also adversely affected the number of bird watchers, picnic groups, ornithologists, avian visitors and researchers coming to the Reserve<sup>[30]</sup>.

Disturbance was a significant threat to the Koshi birds. The workers disturb birds all the time by their presence and also by the nature of the work. An estimated 300 tractors and 10 excavators have been reported working in part of the Bengal Florican's habitat, for instance. Collecting firewood, fodder, and edible wild vegetables, e.g. ferns, and other natural resource extraction activities were constantly putting pressure on birds<sup>[31]</sup>.

The following table shows the activity of wild elephant and wild water buffalo in the core reason of reserve and marginal area. The observation stated that the activities of human increases in the winter season, so, wild animals come to the marginal areas or out of wetland. But in summer and rainy seasons people could not go to the inner part of the field. Therefore the wild animal did not feel disturbances and remained in their niches.

**Table 14:** Frequency of wildlife appeared in the settlements

S. N.	Point of observation	In summer season (3months)	In winter (3 months) Kharkhadai	Remark
1.	Madhuban	6 times, Wild buffalo appeared	37 times wild buffalo appeared	
2.	Madhuban	4 times wild elephant appeared	21 times appeared	
3.	Shreelanka	20 times wild buffalo appeared	47 times appeared	
4.	Shreelanka	9 times elephant appeared	34 times it appeared	

#### o. Events of Human wildlife conflict from 2012 to 2018

**Table 15:** Events of human wildlife conflict

S. N.	Type of animal Killed	Number of animal killed	Human killed	Major human casualties	Major wildlife casualties	Remark
1.	Wild water buffalo	5	17	89%	30%	
2.	Wild elephant	1			18%	
3.	Others	29			11%	

Data With help of Reserve authority and locals

Human wildlife conflict was an unsolved problem in Koshi tappu wetland area. Due to the activities of both wild life and people the cases of death in both side was observed. During six years of time five water buffaloes, one wild elephant and 29 other mammals were killed. In the same duration 17 people died being the victim of conflict. The research conducted by NARC got a finding that three wild water buffaloes, one elephant and 22 others animal and 9 human were killed<sup>[13]</sup>. While talking about the conflict human casualties came in higher position occupying 89%. Conflict between people and wildlife was a major conservation issue that was difficult to resolve. It was difficult to decide what to do when the needs of people clash so directly with the needs of threatened species. Illegal activities of people in reserve area were the main problem for the management of reserve<sup>[2]</sup>.

#### p. Human wildlife conflict

Out of 58 kilometers perimeter of wetland 22 kilometer was blocked by solar fences. It was mainly for containing wild water buffalo and wild elephant.

The major activities to threat the wildlife specially focusing to the wild elephant and wild water buffalo were Patrolling, Youth mobilization, Torch light threatening, Darting, siren, vehicle noising etc.

The result of one research indicates that households living closer to the Koshi Tappu Wildlife Reserve (KTWR) were more likely to reveal negative attitude towards conservation. The respondents from larger households tend to show negative conservation attitude. Households with poor socioeconomic status and greater dependence on the KTWR for firewood, fodder, and raw materials are likely to possess a more negative attitude towards conservation<sup>[32]</sup>. Inhabitants derived income from wetlands as well as other natural resources, they earn money from livestock rearing, rice paddies, captured fisheries, firewood and driftwood collection, mat weaving from Pater (*Typha angustifolia* L.) and income from selling an edible wild vegetable plant called Neuro<sup>[33]</sup>. These activities of people certainly increase the park and people conflict.

#### q. Relation of livestock to wild buffalo

Both the cattle and wild buffalo and other herbivores grazed upon the same fields and plants. The domestic buffalo used same water pit for bathing mud wrapping on the body. The local people made the cross breed of domestic buffalo with the wild water buffalo. It adversely affect the population of the wild water buffalo. The main purpose to make cross breed were found as follows.

**Table 16:** Purpose of making cross breed with the wild water buffalo

S. N.	Purpose	Percentage of respondents	Remark
1.	Meat quality improvement	71%	Total respondents 40
2.	Milk quantity and quantity improvement	14%	Total respondents 40
3.	For the exporting	5%	Total respondents 40
4.	For the local sale	10%	Total respondents 40

For the purpose of meat quality improvement 71% people crossed their domestic buffalo to the wild. Similarly 14% did so for the milk quality and quantity improvement. Some

**Table 17:** Objectives of firing on the grassland

S.N.	Purpose of Firing	No of respondents	Percentage	Remarks
1.	For the manner to the grass of same field	306	51%	Total respondents 600
2.	To make ash as fertilizer for agricultural field	187	31.16%	Total respondents 600
3.	To kill the pest insects and nematodes	69	11.5%	Total respondents 600
4.	To be prevented from wild animals	54	9%	Total respondents 600
5.	Other purposes	16	2.67%	Total respondents 600

Out of 600 respondents 306 replied that firing was done for organic manner to the grass and wild sugarcane. They thought that after firing growth of buds accelerates rapidly. Some 187 people wanted to make ash as organic fertilizer to the garden and agricultural field. Some put the fire to destroy the tall grasses near their houses and to be prevented from wildlife and forest fire.

Another study was conducted by Pokharel and got a finding main cause of firing by people is for the good and productive growth of grasses and wild sugarcane [34].

### Conclusions

Koshi Tappu Wetland is first Ramsar site and only the Wildlife Reserve of Nepal. The study focused on the peoples' harmful activities on wetland's ecosystem. Field visit, direct observation, questionnaire and interview methods were applied for this one year long study. About 60% of house roof and 76% houses' walls were made by Kans. Almost all (98%) people of the settlements was going to the wetland for different purposes -90% for fire wood, 89% for grass and fodder, for edible fern (*Niguro*) picking 43%, for fishing 48.1%, for wild sugarcane collection 97.83% for farming (17%), *Typha* harvesting (55.83%), mud collection (62.67%) and shoot collection (33.5%).

Each household had kept 5.2 number of cow, 5.1 buffalo, 6 terai sheep and 5 number of goat in average, among them 84% was found to be let free in the wetland area. The local people depended on firewood (87%) as source of fuel energy and for the livelihood 98% depended on the wetland. About 289 (48.1%) households were involved in fishing daily but their fishing practice was not ecosystem friendly. Pattern of using inorganic fertilizers and pesticides was found maximum as 211 kg/ha/yr urea, 84 kg/ha/yr potas and 0.13 kg/ha/yr pesticides. The picnic groups were 412, 76.8% of which with the loud speakers. Wildlife human conflict was mainly by human cause (89%). Local domestic female buffaloes were let there for mating aimed to produce crossbreed (71%) for improvement of meat quality. People put on the fire in wetland for the better growth of newly born grasses (71%).

exported to India and third country too. Some sell the crossed baby breed in local market. According to NARC the main purpose was to improve meat, second milk, third export and fourth local sale [13].

### r. Firing

Local people put the fire frequently in the reserve. Mostly they put on the March and April month every year. A huge mass of smoke, smog and fog can be seen in and around the reserve in winter season. The firing also has the great loss to the wildlife and vegetation. The respondent gave the following responses while asking the reason of firing. The firing was also one harmful activity to the wetland or wildlife reserve.

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