



Hunting and Illegal Trade of White-Breasted Waterhen *Amaurornis phoenicurus*: Evidence from District Mardan, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Many of the waterbird species are generally thought to be threatened mainly or at least partly by over hunting. This paper provides novel information on the causal factors that lead to hunting and illegal trade of waterhen *Amaurornis phoenicurus* in a remote villages of district Mardan, Khyber Pakhtunkhwa, Pakistan. Data were collected by adopting a mix scientific approach including Participants' observations, interviews and structured questionnaire. Our results showed that the local villagers of the remote area of district Mardan were the active observers of trapping, over hunting and trading of waterhen in the study area. The structured interviews with locals revealed striking facts about ongoing hunting and illegal trade by hunters and traders. The two tribes namely Ottomankhail of district Swabi and Mamund of district Buner were identified to be involved in illegal trafficking and trading of waterhen from the study area. The locals revealed that traders and hunters entered the area through two main routes of Sarmalang and Narangi. The hunters and traders of the neighboring districts visit the study area throughout the year, in heavy monsoon rain and even at night. The locals revealed that the local hunters used variety of trapping and hunting tools including traditional traps made up of clothes, smaller pinch traps and bamboo cages, air rifles, shotguns (single and double barrel) and sometimes for full entertainment Kalashnikovs were also used for the killing of medium-sized and large mammals (golden jackal and wild boar) in the study area. Summer appeared to be the best season for hunting. The interviews with locals revealed that the main purpose of trading and hunting of waterhen includes hunting for entertainment purpose, high economic value of waterhen meat in black market, use as a food item and medicine and game hunting. The local politicians, criminal groups and village headmen provide cover to hunters and traders that enable them to continue illegal trade in black market. The ground survey shows that waterhen is facing extreme threats from hunting and illegal trading. The government wildlife department is less equipped to tackle the hunters in the area. We outline a strategic plan for conservation of birds, other wild animals and their habitats.

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AS, M Awais, M Aslam and HU conducted the research. KG coordinated in study design. MI and SM constructed the questionnaire. AS wrote the draft manuscript. RUK revised the manuscript and analyze the data.

Key words

Hunting, Illegal trade, White-breasted water hen, Mardan, Towns

INTRODUCTION

The alarming loss of biodiversity and ecosystems is mainly or partly associated with increasing human population that can have severe consequences on the environment (Jackson *et al.*, 2001; Lotze *et al.*, 2006; Worm *et al.*, 2006; Cardinale *et al.*, 2012). Among the resultant pressures that negatively affect the environment,

overexploitation of natural resources is mainly regarded to be responsible for the decline of numerous terrestrial vertebrate species. An unsustainable level of take-off is considered to be the main threat for 37% of the 12% of birds threatened globally with extinction (Hilton-Taylor, 2000; Bellard *et al.*, 2012). Over-hunting and illegal trade are the two main emerging threats to wildlife and biodiversity in Indian-subcontinent and parts of China (Zhou and Jiang, 2004a; Nijman, 2010; White, 2018), especially in areas where international trade and commercial exploitation play an utmost important role (Gao and Ma, 2004; Zhou and Jiang, 2004a; Zhang *et al.*, 2008; Liang *et al.*, 2013). In China, at least 183 bird

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species were listed threatened mainly due to over-hunting (Xu *et al.*, 2014), while additional 56 species (30.6%) were threatened at least partly by hunting (Shen *et al.*, 2020). Bird hunting is generally regarded to be a primary threat to birds; however, few studies documented bird hunting at the local scale. While most of the studies existing on these topics are generally concerned with pet trade (Robinson and Sinovas, 2018; Xu *et al.*, 2020) rather than hunting as a meat source.

In Pakistan, the illegal trade of wildlife is banned under the Wildlife Trade Control Act (2012), which was promulgated in line with the country's ratification of the Convention of International Trade in Endangered Species of Fauna and Flora (CITES). In March 2018, a Memorandum of Understanding (MoU) was signed between WWF-Pakistan and United Nations Office on Drugs and Crime (UNODC) to strengthen the governance machinery and enhance the ability of law enforcement agencies against illegal wildlife trade and hunting. This collaboration was intended to launch combined awareness campaign about unlawful trading of wildlife in Pakistan (WWF-Pakistan, 2018). Despite Pakistan's agreement to collaborate in global efforts for the conservation and protection of wildlife, many studies indicated cases of illegal trade of wild species. In view of the trade sanctions imposed by national government and international organization, the illegal trading of species still exists mainly in the areas with poor governance machinery. Such cases have rarely been reported due to poor socio-economic condition of the area, lack of awareness about wildlife and illiteracy.

Waterbirds face many threats and challenges from direct or indirect human activities in the form of habitat loss, pollution, human disturbance and illegal hunting. Among multiple threats the habitat loss is regarded the most common threat to waterbirds. Human disturbance is also widely considered another threat to waterbirds affecting almost 73% of threatened species in China. In migratory and non-breeding season, many of the herbivorous birds including cranes, ducks and geese forage in farmlands. It is thought that waterbirds might affect livelihood of local people and thus often driven off (Yu *et al.*, 2017). The increased human activities disturb waterbirds in various ways such as reduction in foraging time, expected increase in vigilance behavior and sometimes often being flushed (Wang *et al.*, 2011). In addition, many wildlife photographers often interfere with waterbird nests in order to get better view of birds. As a result, waterbirds that are sensitive to human interference are forced to abandon original nesting habitats (Li *et al.*, 2017).

Traditionally, bird hunting has mainly been a method of getting income by people in underdeveloped regions. It has been shown that in the late 1980s, almost 50% of

wintering ducks and geese were killed each year in the middle and upper reaches of the Yangtze River (Wang *et al.*, 2017). In the lakes, the poaching of geese and ducks is still frequently occurring. This may be the main cause for the population decline of critically endangered Baer's Pochard *Aythya baeri* and the vulnerable Lesser White-fronted Goose *Anser erythropus* at Yangtze River of China. It has been documented that in the coastal regions of China, some poachers sell eggs of gull in the markets which is the main cause of near extinction of the critically endangered Chinese Crested Tern *Thalasseus bernsteini* (Chen *et al.*, 2015). Overall, bird hunting is also considered to be a highly profitable business along the Mediterranean coasts of Egypt. It was estimated that about 75% killing observed was illegal. The hunters mainly or partly received economic benefits from bird hunting that varied from representing a major income to covering basic subsistence.

Besides other challenges, the illegal trade and hunting is considered the main challenge for conservation of wildlife in developing world (Wyler and Sheikh, 2008; Brown and Davies, 2014). Many species including rhinoceros (five species), snow leopard (*Panthera uncia*) and tiger (*Panthera tigris*) are becoming endangered due to their annihilation through extreme hunting and illegal export (Baillie *et al.*, 2008). Many studies suggest that illegal wildlife trade is the single largest threat to wildlife all over the developing countries (McMurray, 2008). Asia especially South and Southeast regions are generally thought to be the areas of greater demands for illegal trade on wildlife (Wyler and Sheikh, 2008). This increased demand of illegal wildlife trade is considered to be the result of national, regional and international efforts for effective wildlife regulations in accordance with CITES agreements. Most of the Asian countries including India, Bhutan, China, Nepal, South Korea and Japan have greater demands for wildlife species parts traded illegally for the purposes of food and medicinal uses (Stoner and Pervushina, 2013). Thus, there is a significant increase in the illegal wildlife trade mainly for economic reason, which has affected the effectiveness of various conservational policies. Currently, many countries have strengthened the conservation efforts for the restoration of some endangered and critically endangered wildlife species (McLellan *et al.*, 2014). Many arrests and seizures related to the illegal wildlife trade present evidence of efforts of the law enforcement agencies in developing countries (DNPWC, 2014).

According to the Khyber Pakhtunkhwa Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015 all the wild animals, free ranging or captive, tamed or untamed, found within the territorial

jurisdiction of the province shall be deemed to be the property of Government. However, Khyber Pakhtunkhwa Province of Pakistan faces many conservation challenges (Khan and Khan, 2017). The waterhen (*Amaurornis phoenicurus*) is a waterbird of the rail and crane family Rallidae. The population of waterhen has distributed across South and Southeast Asia (Akhtar *et al.*, 2013). However, little has been known about the status, distribution and conservation of this species from Pakistan. The waterhen is subjected to massive hunting across different areas of KP Province and the present study provided the novel information on hunting of waterhen from this geographical region.

The socio-economic condition of Khyber Pakhtunkhwa Province is less developed compared to other provinces of Pakistan. Due to the recent wave of terrorism local population of the province has also suffered a lot. Thus, the people mainly trade with wild species to improve their livelihood. This practice of trading and hunting is an ancient tradition for subsistence among the tribal groups. Consequently, local people encompass the skills to attract more traders and hunters to capitalize the demands of wild bird meat and likely to play a key role in this trade. Hereby, we provide the novel evidence about ongoing hunting and trading of white-breasted waterhen (hereafter waterhen) from a less developed area of district Mardan, KP. Province through three different methods including participants' observations, questionnaire based surveys and interviews with key informants. In order to provide up to date information and evidence to government departments and researchers about the ongoing hunting and trading of waterhen *Amaurornis phoenicurus*, it is important to assess and uncover the causal factors leading to illegal trafficking in remote villages of district Mardan, Pakistan. We also outline a design of strategic plan for conservation and protection of local wildlife by the formation of Nature reserve and improving the livelihood of local community.

MATERIALS AND METHODS

Study area

The study area for this research is located in district Mardan, Khyber Pakhtunkhwa, Pakistan ($34^{\circ} 18' 46.6488''$ N, $72^{\circ} 9' 1.1304''$ E). The area mostly comprises of 30 main towns covering an area of 43,000 ha (Fig. 1). The area contained a total of 36 union councils in which the people are geographically dispersed. The irrigation system is well established and the main occupations of locals are farming, herding and trading. The area is surrounded on the north by Buner district and protected areas of Malakand, on the east Sawabi and Buner districts, on the south Nowshera district and on the west Charsadda district

and protected areas of Malakand is located. The area is not very populated but has small number of settlements mainly of farmers. Agricultural landscape includes three components viz., agricultural crops, grasslands and tree species both local indigenous trees and ornamental trees that provide nesting habitats to many bird species. Besides that, ground flora of herbs, shrubs and ground weeds is present that also provides food sources to many birds. The 20-acre forest chunk of *Eucalyptus camaldulensis*, Bakain *Melia azedarach* and *Populus deltoides* plantation is also the part of agricultural lands. Ballar stream is the main water body of the area originating from Sudhum valley that flows from northeast to southwest and finally joins Kalpani stream at Mardan. Kalpani stream drains into Kabul River (Sadam *et al.*, 2022). The area has a hot semi-arid climate. The summer season is very hot which starts from May to June, a quick rise in temperature is reported during these months. The maximum temperature is recorded for the month of June which is 43.5°C (110.3°F). The winter season is the coldest which starts from November and ends in January. The coldest months are December and January with mean minimum temperature of 0.5°C (32.9°F). Maximum rainfall has been recorded for the months of July, August, December and January.

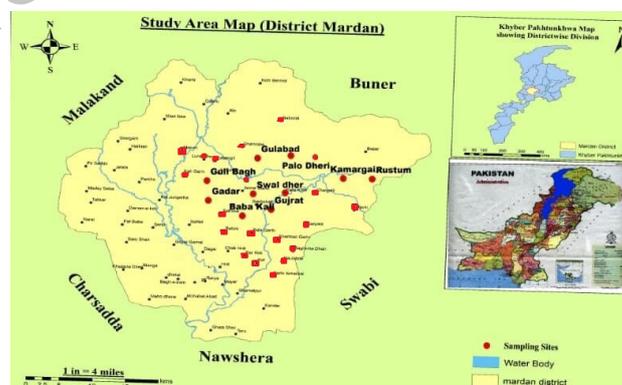


Fig. 1. The map of study area showing selected sites.

Methodology

Data were collected about the illegal trade and hunting of white-breasted waterhen from remote villages of district Mardan by adapting a mix scientific approach which includes three different methods such as competitor observations, indirect interviews and questionnaire based surveys. Competitor observation is a widely accepted method in anthropology and conservation sciences which enable the researchers to closely observe and learn the implicit and understand characteristics of the local community (Musante and DeWalt, 2010). This conservation method was followed for many reasons.

However, this participant observation was conducted in an unstructured way in the sense because the researcher must follow the schedule and activities of the information provider, rather than imposing a framework that interferes with their normal daily life. Therefore, we used qualitative interviews with local people to provide textual data about “what people say”. The difference between them and structured questionnaires is that they adopt a two-way dialogue, with discussion and follow-up questions at each point, rather than a question and answer session without discussion. It benefits researchers in two ways. First, the information providers provide most of the conversations, and the researchers encourage them to talk openly and freely about their experiences and actions in the research field. Secondly this approach allows researchers to maintain moral limitations while respecting their right not to answer any specific questions.

During the research period, the researchers also made personal visits to the study area and met with village headmen at least twice in a month. Each visit was planned for 58 days from February to September 2018 and August 2021, and a total of 60 visits were conducted to collect data in Mardan district. During these field visits, the researchers have participated in variety of cultural and traditional village ceremonies, meetings, community dialogues, debate on ongoing hunting and trading and other human-wildlife conflict issues in the area. The key informant interviews were carried out with local people during these visits in order to collect information on various factors that include the relationship of locals and nature, community culture, many wild animals, economic condition, natural resource use, status of wildlife in the past, ongoing threats and decline of wildlife population and perception of locals about wildlife protection and conservation. All the responses of key respondents were filled textually in local language and used extra sheets where necessary for any other specific remarks of locals about wildlife hunting and trading.

The third source of data collection was a questionnaire-based survey, which was carefully designed and filled out through locals ([Supplementary Table 1](#) for the sample questionnaire). Each questionnaire was filled in with the consent of interviewees, and their personal information along the GPS coordinates was recorded. A total of 1500 questionnaires were filled in through interviews in local language from 30 selected villages of Mardan District. The main questions included wildlife trafficking, illegal hunting, trading and medicinal uses. By adopting a convenient sampling method, we selected cross-sections of relevant members of the society to fill in the questionnaire on key variables, and at the same time record the coordinates of each respondent’s location

through GPS equipment. A preliminary investigation was conducted to distinguish the characteristics of villagers based on their encounters with merchants, hunters, and wild animals in different villages. Respondents who have a good understanding of local illegal trafficking and hunting and actively observe wild animals were selected to conduct the questionnaire survey. The researchers verified the preliminary information provided by the local community through preliminary investigations and assessed the most valuable responses about possible threats to wildlife. It was observed in the supplementary question that the selected villagers often encountered hunters and potential merchants in summer. The information collected from the interviewees was systematically and logically verified through proxy questions in accordance with the suggested method ([Abbas *et al.*, 2015](#); [Ali *et al.*, 2015](#); [Babar *et al.*, 2020](#); [Zahoor *et al.*, 2021](#)).

Statistical analysis

Simple descriptive statistics were performed on the collected data to measure the response on each question asked during survey. The key variables in the questionnaire included perception of people about hunting and trading of waterhen to the neighboring areas; whether the locals believe egg collection a reason for population decline of waterhen, whether the local villagers had observed hunters and traders in the area, government response against the hunters and the socioeconomic condition of respondents in the area. The locals belonged to five major professions that included Drivers, Shepherds, Farmers, Hunters and Woodcutters. To test whether these individual characteristics of locals affect their perception and environmental worldview, a Chi-Squared test was performed to compare the distribution of these variables with their expected distribution. A statistical Package for Social Sciences (SPSS) was used to analyze the data.

RESULTS

All the potential sites of 30 towns were visited during the survey period. Before data collection general discussion was carried out with local community members about hunting and trading. The local community members who had sufficient knowledge about ongoing hunting and trading were invited for structured interviews to present their opinions voluntarily. Occasional informal discussions were also made with local villagers mainly with elder people, shepherds and hunters that helped us to gain trust and build an overall positive rapport with local villagers. This also enabled us to understand the concerned issues about wildlife, livelihood of locals and cultural history. This information was then used for better assessment of

local resource-use pattern, perception of local people and potential issues that might arise between the government and locals. The volunteers of the study area had shown differences in their professional background, literacy and age; therefore, their responses might have been affected by individual characteristics. The respondents showed great variation in demographic characteristics. For example, an old respondent more accurately observed the incidence of hunting and trading compared to young respondent (<22 year). Overall old age (>50 years) people accounted for 19% who witnessed the incidence of hunting by hunters and confirmed that the population of white-breasted waterhen declined due to mass hunting and trading. Similarly, the educated respondents showed a more positive response toward the existence of waterhen considering it valuable for biodiversity compared to less educated or illiterate respondents. The education background of about half the respondents was below the literacy level given that 49% of the respondents had no primary, secondary or higher educational backgrounds.

Table I. Demographic characteristics of local respondents.

Variables	Frequency	Percent (%)
Age		
Less than 22 years	5	5.00
22 to 32 years	36	36.00
32 to 42 years	21	21.00
42 to 52 years	19	19.00
52 to 62 years	13	13.00
62 to 72 years	4	4.00
72 to 82 years	2	2.00
Education		
Illiterate	49	49.00
Primary school	30	30.00
Secondary school	11	11.00
Higher secondary school	6	6.00
University	4	4.00
Occupation		
Farmer	38	38.00
Driver	15	15.00
Hunter	7	7.00
Wood cutter	4	4.00
Shepherd	27	27.00
Other	9	9.00

Perception of local community

The preliminary surveys showed great variation in the perception of local residents about waterhen in the study area. For instance, 85% respondents believed that egg collection by the locals was a main reason of the population decline of waterhen whereas only 14.84% respondents did not consider egg collection a threat or remained neutral in responding to the question. A chi square test was conducted to test the dependence of outcome variable on the attitude of the local respondents (Table III). The analysis for each outcome and attitude (likeness or dislikeness) showed no significant dependence of this variable on the attitude of respondents, revealing that information on other outcome variables was unbiased. The corresponding percentages and frequencies against each question asked from respondents are presented in Table II.

Hunting/ trading identified by local villagers

The local villagers of district Mardan were found to be the active observers of ongoing hunting, killing and capturing of white-breasted waterhen. During data collection the researchers were brought to the potential habitats of waterhen by local residents where incidence of hunting of waterhen took place. The local residents and shepherds observed traders and hunters in the study area during both winter and summer season. The interviews with locals revealed the fact that despite willingness of some local villagers to stop the hunter entrance to the area, the local people did not have the relative influence or power to tackle the hunting groups. The local villagers claimed that the hunting groups were supported by the local criminals that were in turn being sponsored by the local political mafia therefore the local people had no relative power to stop them. The structured interviews also revealed some striking facts about the ongoing hunting by hunters and traders of the neighboring districts. The respondents identified two main Pashtun tribes in the neighboring district Swabi (Otmankhail tribe) and Buner (Mamund tribe), the people of which regularly visit the study area for the hunting of chakor *Alectoris chukar*, pigeon *Columba livia*, doves *Streptopelia* spp., golden jackal *Canis aureus indicus* and especially waterhen. The local villagers observed a group of hunters ranging from 15-20 persons having their own security arrangements including guns, pistols and well-trained domesticated dogs. One respondent's view is transcribed as following: While grazing goats and sheep in grassland near ballar stream I personally saw a group of 20 hunters equipped with guns, pistols and well trained dogs. They belonged to district Swabi (Otmankhail tribe) and were walking in the bushes along ballar stream.

Table II. Percent response frequencies on the attitude of local respondents of the study area (n=1500).

Question	Response (%)		
	Yes	No	Neutral
Have you seen waterhen on your fields?	49.00	30.00	21.00
Do you perceive that egg collection is a direct threat to waterhen?	85.15	5.01	9.84
Have you ever observed the killing of waterhen in this area?	35.50	14.50	50.00
Have you seen hunters in the area?	55.50	13.12	31.38
Do you believe that population of waterhen declined?	81.13	2.00	18.87
Do you believe that these waterhen are hunted by the hunters of neighboring districts?	61.91	27.81	10.28
The reason of waterhen hunting in the area is the selling of their meat to the neighboring districts.	52.10	30.41	17.49
Have you seen government action against hunters to stop hunting in the area?	9.12	89.32	1.56

Table III. Multivariate analyses on the perception of local villagers toward Waterhen in the study area.

Variables	Positive response (%)	Negative/Neutral response (%)	χ^2	df	p value
Education					
Illiterate (n=49)	15	34	1.35	2	0.507
Primary level (n=30)	13	17			
Secondary or higher level (n=21)	8	13			
Occupation					
Farmer (n=38)	14	24	3.99	3	0.262
Driver (n=15)	5	10			
Shepherd (n=27)	6	21			
Hunter, wood cutter and others (n=20)	10	10			

The P-values indicated that the responses of local villagers are slightly dependent on educational background; however, the distribution was independent suggesting no biases in the outcome variables.

Most of the hunters in the study area were sponsored by local politicians mainly by Tehsil Nazim of local villages. The hunters and traders visit study area uninterruptedly in the morning and in the evening during summer and winter seasons. One of the respondents described his view about the hunting season as below: Though the hunting is common in both summer and winter but summer is the best season because in this season waterhen makes loud and repetitive croaking calls mainly in early morning and evening therefore it is easier for hunters to locate the hunts.

Another respondent's view about ongoing hunting and political interference is transcribed below: While cutting wood in the farmland I came across a group of 15 hunters belonging to district Buner (Mamund tribe) along with local Nazim having his own security arrangements, security guards, shotguns and well-trained dogs. They were hunting for recreation and entertainment purposes.

Purpose of killing

The killing and hunting of domesticated and wild animals is practiced for many purposes. Like all the developing countries, Pakistan is also facing severe threats to variety of animals and birds. It was found during the

interviews with locals that the purpose of killing, hunting and capturing of waterhen includes game hunting, hunting for entertainment and recreation, medicinal uses and transportation of its meat to the neighboring districts. The local respondents claimed that the meat of waterhen was very expensive and was being used as a food and medicine. The hunters had some special arrangements and the sales were not made directly to the local villagers. The locals claimed that the meat was brought to the cities of neighboring districts where it was handed over to special agents. These agents then sell the meat to the local traders. The respondents however, remained silent about the exact price of waterhen meat in the black market.

According to the respondents of the study area, the hunters and traders nearly killed and trapped every animal that had an economic value in the black market including wild boar, chakor, pigeon, dove and golden jackal. For instance, the hunters used well trained hunting dogs (Tazi Spi, in Pashto language) to chase and kill golden jackal during summer season. The respondents further claimed that in this type of game hunting the hunters gather in large groups in these villages, each one having its own well trained domesticated dogs. The tail of the red jackal

was used for decorative purposes in the transport vehicles. Furthermore, the elders' responses in the study area showed that the wild birds such as chakor and quails captured in the study area were traded to neighboring districts for fighting purposes.

Method of hunting

The local residents and hunters used a variety of trapping tools including traditional traps, metal leg traps, bamboo cages and smaller pinch traps. All the above traps were manufactured in local towns. Some local villagers also used traps made up of clothes while well-trained hunting dogs located the hunts. Hunting with bows and arrows was also common in younger population of all the villages. Besides all the above capturing tools the hunters and traders also used shotguns (Single-barrel and double-barrel) and pellet guns (air rifles) and sometimes for enjoyment and entertainment Kalashnikovs, hand grenade and rockets were also used in the study area. Both shotguns and pellet guns were available in the local village shops. One of the respondents of the study area transcribed the hunting tools as: While working in my field, I personally observed 18 hunters that had well trained dogs, pistols, pellet guns and double-barrel shotguns. They were also having Kalashnikovs.

Another respondent's view about extreme hunting of waterhen is given below: I have personally observed that the local residents used a variety of hunting tools for the shooting of waterhen including single barrel and double barrel shotguns and air rifles. I personally believe these guns are a devastating threat for waterhen because it is being used everywhere in the village.

Illegal trade and its transportation

The local respondents collaborated in finding of some special routes through which hunters and traders entered the study area. The structured interviews with locals revealed that hunters and traders entered the area through two main routes viz., Sar Malang and Narangi to reach Sudhum Valley. The hunters approach through these routes and then disperse in the study area to hunt the waterbirds, quails, chakors, doves, golden jackals and more specifically waterhen. In all these villages the hunting was carried out throughout the year even in heavy monsoon rain and night. The respondents claimed that enormous number of waterhen were killed and transported to neighboring Swabi and Buner districts. The claim of one hunter who had a previous hunting experience is transcribed as: I hunted many waters hen from 2011 to 2015 for the traders of district Buner and district Swabi on rent of 1000 Rs/day. These traders own many hunting groups who work for them on daily basis. One day I observed that some clients

had come from Saudi Arabia and they were talking about waterhen meat.

DISCUSSION

The study showed that the hunting of waterhen in backward rural villages of district Mardan, Khyber Pakhtunkhwa, Pakistan was extremely high at local level. Like other developing countries Pakistan is also facing many conservation challenges. These include, but not limited to, inefficient governance machinery, lack of sufficient data on population and status of wildlife, illiteracy and poverty of local people and criminal mindset of illiterate people. Based on the current socio-economic status of local villagers in the study area and the illegal hunting and transport of waterhen meat to the neighboring districts, this continuous practice of poaching and trading could reach the extent of complete extinction of waterhen from the area. The facilitation of hunting and killing by local political mafia pose another challenge to the wildlife conservation staff. Given the high market value of waterhen meat, the contribution of local hunters and criminal people with traffickers and trader groups is likely to cause an extreme decline of waterhen population in the study area. Interviews with locals suggest that until 1999 the wildlife resources were abundant and hunters just used shotguns and well-trained dogs to kill large mammals such as golden jackal and wild boar for fun and entertainment purposes. Subsequently the local villagers began to sell the wildlife at local towns on very low prices. With the passage of time as the socio-economic condition of local people dropped and the ratio of crime increased, more people were attracted towards hunting and trading of bird species including other wild animals; a prosperous black market has developed since, and the illegal trade continues unabated.

Thus, now many of the bird species have become a hunting quarry in these villages. One of them is the waterhen, the meat of which has a very high market value. According to the views of local people, this situation arises because they are consumed very widely as a traditional medicine (Aphrodisiac). This implies that the traditional culture plays a significant role in the conservation of birds and other wildlife at both local and regional scale.

The impact of hunting has been aggravated by habitat destruction, human interference and overgrazing. The locals revealed that the potential nesting habitats of waterhen are still used for grazing activities. Numerous trees have been cut down due to farming activities in the area. Due to increased human disturbance and farming activities many of the ground nesting bird species move to potential grassland habitats where they are also facing numerous threats from cattle grazers, shepherds and

neighboring farmers.

The field survey of the study area shows hunting, trading and resultant illegal trafficking of meat as major threats to waterhen. The responses of local people showed that there was high population of waterhen in the past, however currently their population has extremely declined. The wildlife department of Khyber Pakhtunkhwa Province is claiming of conserving potential habitats of waterhen. However, the ground survey showed extreme threats to waterhen population from hunting, egg collection, capturing and illegal trading. The wildlife staff is ill equipped to tackle with local politicians, criminal people and hunters in the area. Despite the extreme hunting of waterhen in the area, the local villagers demanded the IUCN to strengthen the enforcement of conservation laws to conserve the population of waterhen. One of the local residents responded in the following way: I have come across waterhen hunters more than 15 times in the last two years. Once I observed a group of traders selling the waterhen (In Beroch, Rustam) just like selling the vegetables on the footpaths.

Summer is the most favorable season of waterhen hunting though hunting continues throughout the year. Because of limited resources and lack of cooperation from the local community, the wildlife department is unable to stop the illegal trafficking of waterhen in the area. The conservation of waterhen in the area needs combined efforts of wildlife department with local community, financial support to locals and strengthening of wildlife rangers with latest equipment. According to the local respondents of the study area, a tribe Ottoman Khail belonging to district Swabi and another tribe Mamund belonging to district Buner were mainly involved in the illegal hunting and trading of waterhen to other cities and provinces. Every year the local residents observe hunters and traders in groups ranging from 15 to 20 individuals with their own safety and security arrangements that include guns, pistols and well-trained domesticated dogs.

The main purpose of hunters and traders was the hunting of waterhen that enables them to continue the illegal trade of waterhen meat in black market. According to the local people, during every four month breeding season, enormous number of waterhens are hunted. The local people revealed that the hunters mainly enter through three or two routes from the neighboring Swabi and Buner districts. The hunters of district Swabi follow the routes of Narangi while Sar Malang is the main route of illegal trade to district Buner. The hunted waterhens were first transported from potential places of Mardan to district Buner and Swabi from where their supply was made to other cities, provinces and abroad. The ground surveys indicate that waterhen is still present in the area but their population has extremely declined. The lack of cooperation of local people with wildlife department

provides encouragement to hunters and traders to continue hunting in the study area.

CONCLUSIONS AND RECOMMENDATIONS

This paper scientifically assesses the causal factors that lead to hunting and illegal trafficking of waterhen in Khyber Pakhtunkhwa Province, Pakistan. Threats to waterhen were analyzed through mixed methodological approach in remote rural areas of Mardan district, Pakistan. The study shows that waterhen faces many threats and challenges mainly to their breeding and survival in the study area. Literature on the threats to waterbirds indicates many factors that cause decline of overall population. These factors include capturing, over hunting, habitat destruction, agriculture conversion, biological invasion, climate change, increased human interference, overgrazing of livestock, illegal killing for entertainment and trading.

Based on current research, we have outlined a sample strategic plan to improve the conservation and mitigate the ongoing threats to waterhen population and its habitats in the remote areas of Mardan Pakistan. It is suggested that:

The only way to conserve the birds that are directly being targeted by hunters in the study area could be the establishment of a Nature reserve and the enforcement of all the laws designed for the protection of birds and their potential habitats.

The illiteracy, poverty and the exploitation of natural resources by locals mainly overgrazing and habitat destruction need to be addressed. The local villagers face many a challenges that include unemployment, low socio-economic conditions that lead to the sale of wildlife, which is the main cause of over hunting in the area. The government needs to provide alternative facilities to the locals for generating income through reforestation and livestock farming.

The employment opportunities should be given to the locals in Nature reserve so that they can efficiently work for conservation of wildlife in their local area. They can guide the visitors about their culture and wildlife species.

The government should take initiatives to promote education in the area.

The government should also strengthen the governance machinery to tackle illegal traffickers and criminal groups in the area.

Only through establishment of Nature Reserve and enforcement of laws designed for wildlife will the population of waterhen remain stable or possibly could increase.

Limitation and future research directions

This research provides novel information on the potential causes of waterhen hunting and trading from a

remote area of district Mardan, Pakistan. However, the current research lacks the detailed data on the exact price of waterhen in black market in different provinces of the country. It would be more fruitful if detailed data on black markets in various provinces are obtained for further analysis. We adopted a mixed methodological approach that included participants' observations and voluntary interviews, other researchers could adopt alternative methods such as panel data on identified regions that may produce more robust results. The present research may also be extended to other provinces to provide more information on the status, over hunting and illegal trafficking.

Ethical approval

This study was approved by departmental ethical review committee of University of Karachi, Pakistan.

Supplementary material

There is supplementary material associated with this article. Access the material online at: <https://dx.doi.org/10.17582/journal.pjz/20210822070833>

Statement of conflict interest

The authors have declared no conflict of interest.

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Supplementary Material

Hunting and Illegal Trade of White-Breasted Waterhen *Amaurornis phoenicurus*: Evidence from District Mardan, Khyber Pakhtunkhwa, Pakistan

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