

## AVIAN BIODIVERSITY OF BAJWAT WETLAND, DISTRICT SIALKOT. PAKISTAN

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### ABSTRACT

Bajwat, an internationally important wetland is located in Sialkot district of Pakistan. During one year study the area was regularly visited with supporting materials such as camera, binocular and bird identification books. We have recorded 110 avian species belonging to 73 genera, 39 families and 15 orders. Passeriformes has highest number of species (39) and genera (23) of which the most abundant number of species are from *Motacillidae* family. Among non-Passeriformes *Anatidae* family has maximum number of species. We are reporting for the first time the assemblage of eight *Aythyaferinas* swimming in a line at midday in a male-female-male-female fashion being still in running water. Most of the resident birds were found to be common or abundant while most of the summer visitors were rare and scarce. Control of pollution and habitat destruction is needful. This is the first report of avifauna of the area showing the richness of biodiversity.

**Key words:** Avian fauna, Wetland, Biodiversity, *Aythyaferina*, Ramsar site, Marala Headworks

### INTRODUCTION

Wetlands are important for a country ecologically as well as economically. Provision of habitat is one of the key functions of wetland. By providing facilities of feeding, breeding, nesting, shelter and social interactions, wetlands cause increase in number and variety of avian fauna. Pakistani wetlands host a large number of resident as well as migratory birds. Waterfowls, the major component of migratory birds, breed in Northern Eurasia during summer and then in winter disperse Southern warmer areas along seven migratory flyways, including "Indus flyway" to Pakistan. Movement of diverse species in large number makes this flyway internationally important. The migratory pathway is determined by sighting landmarks. It has also been proved that birds make use of an internal magnetic compass and position of sun and stars (Grewal, 1993). Wetlands are also ecologically fragile, liable to degradation under the prevailing anthropogenic pressure (Gupta and Singh, 2003), which may affect the avian fauna of a region.

The study area "Bajwat" is located in district Sialkot (32°62' N and 74°60' E) of Punjab province in Pakistan. Bajwat is the most distinctive part of district Sialkot in terms of fauna and flora. Bajwat, the northern part of Sialkot district, covers an area of 19452 hectares (48068 acres). The area is a wetland of international importance due to the presence of Marala Headworks, Munawar Tawi, Jammu Tawi, many nullahs, ponds and marshy areas. This very habitat attracts a large number of waterfowls and other birds. Marala Headworks built in 1965-68, is located in the south-west corner of the

area. Two canals, Upper Chenab and Marala-Ravi link canal, and come out from Marala Headworks. These canals also play a supportive role in grooming of avian fauna of the area. Jammu city is located in the East side of the area while Jorian city of Indian occupied Kashmir is in the North side. Sialkot city is in the South and Gujrat district is located in the West. Ecological conditions of the area are suitable for resident as well eye-catching for migratory species. Perceiving the importance of Bajwat, the area was declared as "Game reserve" by the Wildlife department of Punjab (Pakistan). About 60 Kilometer boundary in the eastern and northern sides is the control line between Pakistan and Indian occupied Kashmir. The area is sub-mountainous and 800 feet above the sea level. The soil is loamy and non-calcareous having sandy and clayey components predominantly. Average rainfall is 965 mm (Qazi *et al.* 2000).

In addition to rivers and nullahs natural habitat of the area majorly composed of riverine forests and tropical thorn forests, which support a large number of birds especially water fowls e.g. ducks, the most beautiful and striking bird. Furthermore, marshy areas, gardens, graveyards, roadside plantation and agricultural fields facilitate a variety of avian species by providing feeding as well as breeding and nesting services which are basic necessities of migratory birds (Lakshmi, 2006).

Bajwat is located in a transitional zone between hills of Jammu in Indian occupied Kashmir and plain area of Punjab. Therefore extensive avian fauna of the area ranges from hilly to plain as well as swampy species. Keeping in view the importance of the wetland, abundance of avifauna and absence of any published report on avifauna, the study was planned with the aim to

identify and enlist various avian species visiting and residing the area and todelineatethreats and recommendations. This may provide a baseline for the future management and conservation of the avian fauna.

### MATERIALS AND METHODS

The survey of Bajwat area with reference to avian fauna was conducted for a period of one year with 1-2 visits per month. Marginal bunds of Barrage and plain areas of Bajwat were surveyed by walking whereas boat was used to visit Barrage Lake, rivers and ponds. Information was collected by using different direct and indirect observation methods. All the potential habitats were visited. Most of the field trips were during the daytime. In direct observation method, birds were noted keenly by naked eye as well as by using binoculars (12x50mm). For immediate identification of birds relevant books (Woodcock, 1980; Bhushan, *et al.* 1993) were used. Some birds could not immediately be identified. Photographs were taken or sketches were made and notes about colour, size, habits and habitats were taken for the later on identification by consulting reference books (Ali and Ripley 1987; Roberts, 1991; Roberts, 1992). Method of indirect data collection was also applied through informal discussions with local residents, employees of wildlife department, farmers and other peoples interested in wildlife. Method for description of abundance of birds was adopted from reference books (Roberts, 1991; Roberts, 1992).

### RESULTS AND DISCUSSION

During the survey, 110 avian species belonging to 73 genera, 39 families and 15 orders were recorded. Out of these 110 species, 5 (4.55%) species were irregular year round visitors, 51 (46.36%) species were resident and 54 (49.09%) species were migratory as mentioned in table 1. Among the migratory birds, 35 species were winter visitors and 19 species were summer visitors (fig

1). Most of the resident birds were found common or abundant while most of the summer visitors were rare and scarce. Highest bird density was seen during cold months i.e. December, January and February. This is probably due to minimum anthropogenic activities in winter months. Order Passeriformes has highest number of families (15), genera (23) and species (39) of which the most abundant number of species (6) are from *Motacillidae* family. While 14 Non-Passerine orders have 24 families, 50 genera and 71 species. Anatidae family has maximum number of species i.e. 14 species. *Aythya nyroca* was observed in the area in January only. *Aythya ferina* (Common pochard) were observed in seven out of 18 visits with the average of 12 birds from rivers, Marala barrage and pools near control line. They were recorded in months of September, October, December, February, March and May. Not observed in very hot months i.e. June, July and August. Eight birds were observed swimming in Marala barrage at 12:15 PM in the month of October. They had made a chain of male-female-male-female in a line, remaining still in running water.

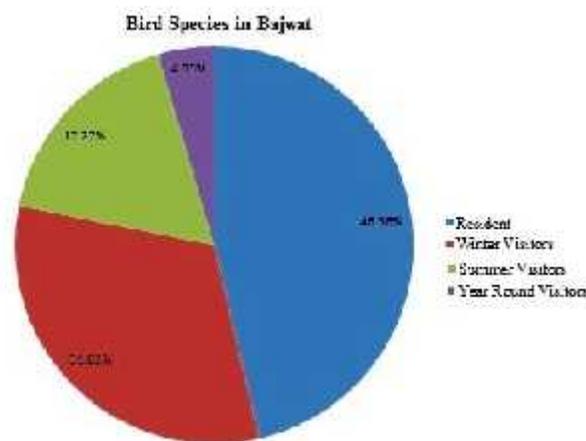


Figure1: Residential status of Bird Species

Table 1: Avian species recorded from Bajwat wetland district Sialkot.

Order	Family	Common Name	Scientific Name	Abundance	Residential Status
Podicipediformes	Podicipedidae	Little grebe	<i>Tachybaptus ruficollis</i>	Scarce	Resident
Pelecaniformes	Phalacrocoridae	Great cormorant	<i>Phalacrocorax carbo</i>	Rare	Winter visitor
		Little cormorant	<i>Phalacrocorax niger</i>	Common	Year round visitor
Ciconiiformes	Ardeidae	Little egret	<i>Egretta garzetta</i>	Abundant	Resident
		Intermediate egret	<i>Egretta intermedia</i>	Scarce	Year round visitor
		Great egret	<i>Ardea alba</i>	Vagrant	Winter visitor
		Grey heron	<i>Ardeacinerea</i>	Scarce	Winter visitor
		Indian pond heron	<i>Ardeolagrayii</i>	Abundant	Resident
		Cattle egret	<i>Bubulcus ibis</i>	Common	Resident
		Night heron	<i>Nycticorax nycticorax</i>	Rare	Summer visitor

	Ciconiidae	Black stork	<i>Ciconianigra</i>	Vagrant	Winter visitor	
Anseriformes	Anatidae	Bar-headed goose	<i>Anserindicus</i>	Common	Winter visitor	
		Northern pintail	<i>Anasacuta</i>	Scarce	Winter visitor	
		Mallard	<i>Anasplatyrhynchos</i>	Abundant	Winter visitor	
		Eurasian wigeon	<i>Anaspenelope</i>	Common	Winter visitor	
		Gadwal	<i>Anasstrepera</i>	Common	Winter visitor	
		Gargany	<i>Anasquerquedula</i>	Abundant	Winter visitor	
		Shoveler	<i>Anasclypeata</i>	Scarce	Winter visitor	
		Spot-billed duck	<i>Anaspoecilorhyncha</i>	Rare	Summer visitor	
		Common teal	<i>Anascrecca</i>	Common	Winter visitor	
		Common pochard	<i>Aythyaferina</i>	Common	Winter visitor	
		Tufted duck	<i>Aythyafuligula</i>	Rare	Winter visitor	
		Ferruginous duck	<i>Aythyanyroca</i>	Rare	Winter visitor	
		Ruddy shelduck	<i>Tadornaferruginea</i>	Abundant	Winter visitor	
		Common shelduck	<i>Tadornatadorna</i>	Scarce	Winter visitor	
		Accipitriformes	Accipitridae	White-rumped vulture	<i>Gyps bengalensis</i>	Common
Long billed vulture	<i>Gyps indicus</i>			Rare	Year round visitor	
Black winged kite	<i>Elanuscaeruleus</i>			scarce	Resident	
Pariha kite	<i>Milvusmigrans</i>			Common	Resident	
Western Marsh harrier	<i>Circus aeruginosus</i>			Rare	Winter visitor	
Galliformes	Phasianidae	Shikra	<i>Accipiter badius</i>	Rare	Resident	
		Black partridge	<i>Francolinusfrancoinlinus</i>	Frequent	Resident	
Gruiformes	Rallidae	Grey partridge	<i>Francolinuspondicerianus</i>	Common	Resident	
		White breasted water hen	<i>Amaurornisphoenicurus</i>	Frequent	Resident	
Charadriiformes	Jacanidae	Common Moorhen	<i>Gallinulachloropus</i>	Common	Resident	
		Common coot	<i>Fulicaatra</i>	Scarce	Winter visitor	
		Purple Swamp hen	<i>Porphyrio porphyria</i>	Common	Resident	
	Charadriidae	Pheasant tailed Jacana	<i>Hydrophasianuschirurgus</i>	Rare	Summer visitor	
		Red wattled lapwing	<i>Vanellusindicus</i>	Abundant	Resident	
	Scolopacidae	Northern lapwing	<i>Vanellusvanellus</i>	Scarce	Winter visitor	
		Common snipe	<i>Gallinagogallinago</i>	Rare	Winter visitor	
		Little stint	<i>Calidrisminuta</i>	Scarce	Winter visitor	
		Common sand piper	<i>Actitishypoleucos</i>	Common	Resident	
		Red shank	<i>Tringa tetanus</i>	Rare	Winter visitor	
		Green shank	<i>Tringanebularia</i>	Rare	Winter visitor	
		Eurasian Curlew	<i>Numeniusarquata</i>	Rare	Winter visitor	
		Black winged stilt	<i>Himantopus himantopus</i>	Rare	Summer visitor	
	Recurvirostridae	Little Pratincole	<i>Glareola lacteal</i>	Scarce	Summer visitor	
	Glareolidae	Black headed gull	<i>Chroicocephalusridibundus</i>	Rare	Winter visitor	
Columbiformes	Sternidae	Indian river tern	<i>Sterna aurantia</i>	Common	Resident	
		Columbidae	Collared dove	<i>Streptopeliadecaocto</i>	Abundant	Resident
		Little brown dove	<i>Streptopeliasenegalensis</i>	Abundant	Resident	
		Red turtle dove	<i>Streptopeliatranquebarica</i>	Common	Summer visitor	
		Spotted dove	<i>Streptopeliachinensis</i>	Scarce	Winter visitor	
		Blue rock pigeon	<i>Columba livia</i>	Frequent	Resident	
		Psittaciformes	Psittacidae	Rose ringed parakeet	<i>Psittaculakrameri</i>	Abundant
Cuculiformes	Cuculidae	Koel	<i>Eudynamysscolopacea</i>	Common	Summer visitor	
		Coucal/Crow pheasant	<i>Centropussinensis</i>	Rare	Resident	
		Pied crested cuckoo	<i>Clamatorjacobinus</i>	Rare	Summer visitor	
		Brain fever bird	<i>Hierococcyxvarius</i>	Scarce	Summer visitor	
		Indian cuckoo	<i>Cuculusmicropterus</i>	Rare	Summer visitor	
Apodiformes	Apodidae	Little swift	<i>Apus affinis</i>	Frequent	Resident	
Coraciiformes	Alcedinidae	White breasted kingfisher	<i>Halcyon smyrnensis</i>	Common	Resident	

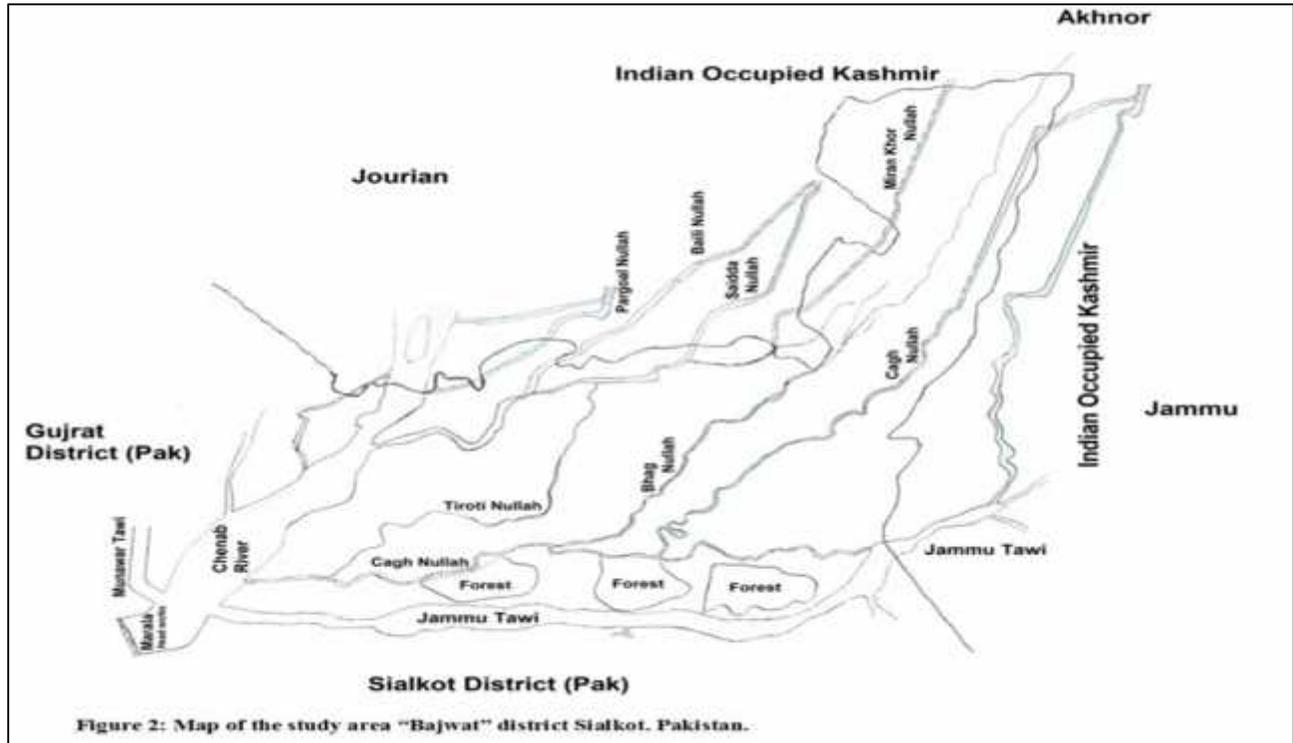
		Pied kingfisher	<i>Cerylerudis</i>	Common	Resident
		Common kingfisher	<i>Alcedoatthis</i>	Frequent	Resident
	Meropidae	Little green bee-eater	<i>Meropsorientalis</i>	Common	Summer visitor
		Blue cheeked bee-eater	<i>Meropssuperciliosus</i>	Common	Summer visitor
	Upupidae	Hoopoe	<i>Upupaepops</i>	Common	Resident
	Coraciidae	Indian roller	<i>Coraciasbenghalensis</i>	Common	Resident
Piciformes	Picidae	Golden backed	<i>Dinopiumbenghalense</i>	Scarce	Resident
		Mahratta woodpecker	<i>Dendrocoposmahrattensis</i>	Rare	Resident
Passeriformes	Alaudidae	Oriental skylark	<i>Alaudagulgula</i>	Common	Resident
		Eurasian skylark	<i>Alaudaarvensis</i>	Rare	Winter visitor
		Greater short-toed lark	<i>Calandrellabrachydactyla</i>	Rare	Winter visitor
		Crested lark	<i>Galeridacristata</i>	Common	Resident
	Hirundinidae	Indian Cliff swallow	<i>Hirundoalvicol</i>	Frequent	Resident
		Wire tailed swallow	<i>Hirundosmithii</i>	Scarce	Summer visitor
		House martin	<i>Delichonurbica</i>	Rare	Summer visitor
		Sand martin	<i>Ripariapaludicola</i>	Common	Resident
	Motacillidae	Oriental pipit	<i>Anthusrufulus</i>	Rare	Resident
		White wagtail	<i>Motacilla alba</i>	Common	Resident
		Large pied wagtail	<i>Motacillamaderaspatensis</i>	Common	Resident
		Yellow wagtail	<i>Motacillaflava</i>	Common	Winter visitor
		Yellow headed wagtail	<i>Motacillacitreola</i>	Scarce	Winter visitor
		Grey wagtail	<i>Motacillacinerea</i>	Scarce	Winter visitor
	Pycononotidae	Red vented bulbul	<i>Pycnonotuscafer</i>	Abundant	Resident
	Laniidae	Rufous backed shrike	<i>Laniusschach</i>	Frequent	Resident
		Bay backed shrike	<i>Laniusvittatus</i>	Frequent	Resident
	Turdidae	Magpie robin	<i>Copsychussaularis</i>	Frequent	Year round visitor
		Pied bush chat	<i>Saxicolacaprata</i>	Common	Resident
	Timaliidae	Common babbler	<i>Turdoidescaudatus</i>	Common	Resident
		Jungle babbler	<i>Turdoidesstriatus</i>	Frequent	Resident
		Large grey babbler	<i>Turdoidesmalcolmi</i>	Rare	Resident
	Nectariniidae	Purple sunbird	<i>Nectariniaasiatica</i>	Scarce	Summer visitor
	Estrildidae	Spotted munia	<i>Lonchurapunctulata</i>	Scarce	Year round visitor
	Ploceidae	Baya weaver	<i>Ploceusphilippinus</i>	Frequent	Resident
		Black throated weaver	<i>Ploceusbenghalensis</i>	Scarce	Resident
		Streaked weaver	<i>Ploceusmanyar</i>	Frequent	Resident
	Passeridae	Yellow throated sparrow	<i>Petronianaxanthocollis</i>	Vagrant	Summer visitor
		House sparrow	<i>Passer domesticus</i>	Abundant	Resident
	Sturnidae	Barhamny myna	<i>Sturnuspagodarum</i>	Frequent	Summer visitor
		Pied myna	<i>Sturnus contra</i>	Common	Summer visitor
		Common starling	<i>Sturnus vulgaris</i>	Common	Winter visitor
		Bank myna	<i>Acridotheresginginianus</i>	Common	Resident
		Common myna	<i>Acridotherestrictis</i>	Abundant	Resident
	Oriolidae	Golden oriol	<i>Oriolusoriolus</i>	Frequent	Summer visitor
	Corviidae	House crow	<i>Corvussplendens</i>	Abundant	Resident
		Jungle crow	<i>Corvusmacrorhynchos</i>	Common	Winter visitor
		Rook	<i>Corvusfrugilegus</i>	Scarce	Winter visitor
	Dicruridae	Black drongo	<i>Dicrurusmacrocerus</i>	Common	Resident

Bajwat, a wetland of international importance, is an attractive place for avifauna especially waterfowls, due to the presence of MaralaHeadworks, three rivers, more than six nullahs, many ponds and marshy areas (fig 2). These water reservoirs support a variety of aquatic and

semiaquatic plants, fishes, amphibians, aquatic arthropods and their larvae, alluring the avian fauna. Bajwat has a peninsula shaped area protruding out into the Jammu; the hilly district of Indian occupied Kashmir. This geographical location catches the attention of numerous

migratory species from Indian occupied Kashmir in addition to international migratory route. Recognizing the international importance of Marala Headworks and Bajwatarea, Ramsar convention on wetlands has declared it a potential Ramsar site and recommended it to be considered for listing under the Ramsar Convention. They have also proclaimed it as wildlife sanctuary (Scott, *et. al.*1990). In addition to this natural habitat, the area

also harbors agricultural fields. Besides fulfilling the food requirements of human population, these agricultural fields serve as “food reservoirs” for avian as well as other wildlife species. Three Jungles are also located in Southern part of Bajwat at the bank of river Tawi. Total area of these Jungles is about 2015 hectares (4978 acres). Flora of these Jungles is a plus point for the fauna of the area.



**Figure 2. Map of study area “Bajwat” district Sialkot, Pakistan**

According to best of our knowledge there is not a single comprehensive article available on avian fauna of whole Bajwat area. Ramsar Advisory Missions report on wetlands of Pakistan (1990) had mentioned that no proper surveys of Bajwat wildlife sanctuary have been carried out and emphasized the need of studies on scientific basis (Scott, *et. al.*1990). This first report will help to accomplish the need with respect to avian aspect of the area. This work may be used as a benchmark for the further studies, conservation and management.

In addition to large number of resident birds the area harbors a large number of waterfowl species, most of which are migratory. Thousands of birds including ducks migrate here in winter and in summer. During the study, 14 species of waterfowls belonging to family *Anatidae* (ducks) were observed. Eight of these species were found to be common or abundant in the area. A large number of these ducks are seen from north-western boundary along Chenab River and south-eastern side along Tawi River

upto Marala Headworks, especially in winter. *Aythya nyroca* (Ferruginous duck) is among Near Threatened species in Pakistan and it could not be observed at Marala Headworks in the second and third week of January every year during 2006-2012 (Chaudhry *et. al.* 2012). In another report (months of January every year during 1996-2005) it was observed from same locality (Akbar *et al.* 2009). Present study also confirms its presence at Marala Headworks and its vicinities. The assemblage of *Aythya ferina* swimming in a male-female fashion being still in running water appears to be amusement time after having a strenuous feeding spell. According to best of our knowledge this is the first report of its kind in *Aythya ferina* and no such observation has been made previously in waterfowls.

Pied myna is found very less in Pakistan in few areas (Roberts, 1992). During this study it was found to be a common summer visitor and was recorded in the area from March to October. According to Roberts 1991,

long billed vulture is absent from Pakistan except for a few pairs from south east corner of the Sindh province. A total of nine vultures were seen in the study area during only three visits in December, February and July. Long billed vultures are supposed to come from Himalayan foothills to the area where they are common according to Woodcock 1980.

*Meropsorientalis* (Little green bee-eater) has an extensive range from Egypt through India, Ceylon and Burma to Siam and Cochin-China (Whistler, 1963). It is a resident species in Pakistan according to Roberts 1991. This beautiful bird was observed in study area only in summer i.e. March to October. In winter the bird might have migrated to relatively warmer districts.

Birds which were seen only once in least numbers during the study were Great egret, Black stork, Tufted duck, Black headed gull, Mahratta woodpecker, Large grey babbler and yellow throated sparrow. Main game birds of the area are goose, ducks, dove, black partridge, house sparrow and common starling. During daytime most of the birds come to open cultivated and residential areas for feeding. In agricultural lands wheat, rice, vegetables and fodder for cattle are mainly cultivated. These cultivated lands are also source of diversity in avian fauna because most of the avian species depend upon food in the form of seeds, grains, weeds and insects of the crops.

Some factors are affecting negatively the fauna and flora of the area. Most of them are due to human activities. Excessive use of insecticides and pesticides is not only contaminating human food stuffs but also eliminating the insects and rodents, minimizing the available avian food variety. The chronic use and excessive doses of pesticides like pyrethroids may become part of food chain leading to a series of hematological, biochemical, reproductive and pathological changes in the avian, fish and mammalian species (Khan *et al.* 2012).

**Threats:** Although the study area “Bajwat” is an important wetland, its wildlife is facing difficulties, majorly due to management issues.

1. Explosion of human population has created a serious problem. Buildings are being made destroying habitat of wildlife.
2. Cultivation of uncultivated area is under practice.
3. The area is subjected to summer flooding, resulting in destruction of crops, natural habitat and associated wildlife.
4. Illegal hunting, poaching and netting are responsible for decline in wildlife population specially birds. Some license holders kill or capture birds, exceeding the permitted limits.
5. Deforestation for commercial purpose, overgrazing and firewood collection is disturbing avian habitat.

6. Usage of pesticides, insecticides and herbicides by farmers, not only polluting the environment but also affecting avian population negatively.
7. Soil erosion due to Chenab and Tawi rivers causing habitat destruction.
8. Lack of funds at Government level is affecting wildlife conservation and management programs.

#### Suggestions:

1. Usage of forest areas for housing and commercialization should be prohibited strictly.
2. Cultivation of uncultivated and forest areas should be banned.
3. Habitat destruction i.e. illegal cutting of trees, wild grasses and bushes must be stopped.
4. The cooperation of forestry department and Rangers with wildlife department in the area will be beneficial for wildlife conservation.
5. Knolls or hillocks in the forests can be made to protect animals and their habitats from floods.
6. Illegal hunting, poaching and netting should be checked.
7. Over-grazing by livestock should strictly be prohibited in the forests and uncultivated areas.
8. Soil erosion by rivers must be stopped because it is causing heavy loss of natural habitat.
9. Use of pesticides, insecticides and herbicides should be made limited and alternatives should be introduced to the farmers.
10. Wildlife awareness and environment education programs should be started for general public and in schools.
11. Help of NGOs working for wildlife e.g. WWF, IUCN etc. should be acquired for improvement of habitat.
12. A wildlife park may be established in the area for the betterment of wildlife.

**Conclusion:** Observation of 110 avian species belonging to 73 genera, 39 families and 15 orders in one year duration indicates the richness of biodiversity of the area and highlights the need of avian conservation. Assemblage of eight *Aythyaferina* swimming slowly but looking stationary in a male-female fashion in river at midday is an incremental contribution in discovery of avian behavior. Habitat destruction and pollution should be stopped to conserve the color of avian beauty.

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