

Waterfowl Population Estimation at Rasool Barrage, Game Reserve, Jhelum, Pakistan (1996 – 2005)

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Abstract

Rasool Barrage Game Reserve, Jhelum was surveyed for waterfowl population estimation from 1996 through 2005 during mid-winter (January) each year. During study total 88327 birds belonging to 6 orders were estimated. Among them 308 Podicipediformes, 3826 Pelecaniformes, 5578 Ciconiiformes, 67791 Anseriformes, 8034 Gruiformes and 2790 Charadriiformes, were recorded. A decreasing trend in waterfowl population, ranging from 15340 (during 1997) to 2263 (during 2003), was observed, due to illegal hunting, netting, fishing, livestock grazing and habitat degradation. Increase and decrease in water level of study area and illegal hunting were recorded the main factors of population fluctuations.

Key Words: Podicipediformes, Pelecaniformes, Ciconiiformes, Anseriformes, Gruiformes, Charadriiformes, Pakistan.

Introduction

Pakistan possesses a great variety of wetlands distributed almost throughout the country from the coastal mangroves and mudflats on the Indus delta to the glacial lakes of the high Himalayas. Total area of inland waters in Pakistan has been estimated over 7,800,000 ha (Naik, 1986). This area includes 3,100,000 ha of rivers and major tributaries, 56,000 ha of irrigation canals, 110,000 ha natural lakes, 92,000 ha of water storage reservoirs, 108,000 ha of ponds, dhands and fish farms, 300,000 ha of delta marshes (Indus) and over 4,000,000 ha of water logged areas, seasonally flooded plains and saline wastes (Naik, 1986 and Scott, 1989).

Gopal (1982) reported that ecologically wetlands may be viewed as more important ecosystems, transitional between open water and terrestrial ecosystems, endowed with specific structural and functional attributes and performing major ecological role in the biosphere. These wetlands are also of great significance as breeding, molting and roosting places for a variety of waterfowl; therefore, have very good potential for scientific research and conservation education.

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In Pakistan there are a few reports on the avifauna of different areas. Baker (1930), Ali (1945), Ripley (1961) and Roberts (1991) have provided important information about the avifauna of Pakistan. Akbar *et al.* (2006) conducted a ten years (1996-2005) survey of waterfowl (Aves) of Patisar Lake at Bahawalpur. Hussain *et al.* (2002) conducted a survey of Rawal Lake, Islamabad and studied the population of migratory and resident species of birds. They recorded 21 birds species belonging to 8 families and 6 orders. They concluded that the decline in the birds population was due to disturbance caused by fishermen, motor boats, visitors of boating club and settlers around the lake. Akbar *et al.* (2009) studied waterfowl diversity at Chashma Barrage and Marala Headworks, Pakistan during 1996-2005. A decreasing trend in waterfowl population at both the wetlands was observed. During study 46 waterfowl species belonging to 26 genera from 11 families representing 6 orders from Chashma Barrage and 44 waterfowl species belonging to 25 genera from 11 families representing 6 orders from Marala Headworks were recorded. For the effective management of a species or population; Rubin *et al.* (1998) stressed on an accurate knowledge of its special distribution. With this aim the present study was conducted to know the waterfowl diversity at Rasool Barrage Game Reserve, Jhelum, Pakistan.

Study Area

Rasool Barrage was declared a wildlife sanctuary in 1973 for a period of three years under the Punjab Wildlife (Protection, Preservation, Conservation and Management) ordinance, 1972. Later on after the expiry of three years period it was subsequently re-notified for a period of five years under the Punjab Wildlife Act, 1974. Wildlife Sanctuary was de-notified many times during the hunting season 1987-88, for ducks shooting. Consequently its status was degraded to Game Reserve on 29-02-1988 under Punjab Wildlife Act, 1974. Since then it is a Game Reserve till now. It is located between 32° 42' N and 73° 33' E and comprises an area of 1138 ha. Rasool Barrage Game Reserve is a reservoir of natural river water. The main function of the Head-works is storage of river Jhelum water to regularize the supply of water to Qadirabad

Headworks and control of flood. About 80% of the game reserve area remains under water throughout the year, the remaining 20% comes under water during flood season. A water storage reservoir with associated marshes and extensive sand banks, created by the damming of the Jhelum river for irrigation purposes. Two embankments extend out into the reservoir and hold back shallow lagoon as the water level in the main channel falls. The water level fluctuates by about 2 meter and the maximum depth is 6.5 meter. The pH value varies between 6.8 and 7.2. The water storage reservoir with associated marshes supports extensive reed beds and an abundant growth of submerged and floating aquatic vegetation. The aquatic vegetation includes *Carex fedia*, *Hydrilla verticillata*, *Nelumbo nucifera*, *Nymphaea lotus*, *Phragmites karka*, *Potamogeton crispus*, *P. pectinatus*, *Typha angustata*, *Vallisneria spiralis* and *Zannichelia palustris*.

Materials and Methods

Rasool Barrage Game Reserve was surveyed for waterfowl population estimation during mid-winter (January) from 1996 through 2005. Visits were conducted in the morning and evening. Average of morning and evening counts were recorded. Survey was conducted on foot and by boat. Marginal bunds were surveyed by walking on the bunds whereas pond area was surveyed by using wooden boat. Binocular standard EZ (10 x 50 mm) Minolta and Swift Telemeter Model 841, Zoom - scope (15x-60x 0.60 mm) were used to observe, spot and identify the birds species following Roberts (1991) and Ali & Ripley (1995, 2001). On site observations were recorded. Informal discussions and dialogues with the locals were also carried out to gather the information about the natural resources of the wetland and its management.

Result and Discussion

Rasool Barrage Game Reserve is a complex of aquatic and terrestrial habitats; therefore it accommodates a large variety of birds. During study period total 88,327 birds of 43 waterfowl species belonging to 27 genera from 10 families representing 6 orders were recorded from Rasool Barrage (Table 1). Family *Anatidae* was recorded to be the most diversified during survey, which was represented by eleven species and comprising 76.75% of the total avian fauna of the study area whereas *Rallidae* by four species, with relative abundance of 9.096%. *Ardeidae* had seven waterfowl species with relative abundance of 6.22%. *Phalacrocoridae* was represented by two species with relative abundance of 4.33%. *Laridae* was represented by four species with relative abundance of 1.39%. *Scolopacidae* was represented by five species. *Charadriidae* was represented by four species. *Podicipedidae*, *Ciconidae* and *Recurvirostridae* were represented by two species (each). The most frequent visitor was

Anas platyrhynchos (23.01%) followed by *Anas acuta* (14%), *Anas crecca* (13%), *Anas clypeata* (8.34%) *Aythya ferina* (7.80%) and *Fulica atra* (7.04%) described in (Table 1).

Maximum population of waterfowl was estimated 15340 birds during midwinter 1997 and minimum 2263 birds during 2003. Population fluctuation during different years is graphically represented in Figure 1. Decrease and increase in water level in study area and illegal hunting are the main causes of population fluctuation.

Mahboob, S. and Zaib-un-Nisa (2009) worked on the avifauna of Trimmu Barrage during 2004-05. They reported 30 species of waterfowl belonging to 22 genera from 10 families representing 6 orders at Trimmu Barrage. They recorded maximum population of *phalacrocorax niger*, *Egretta garzetta*, *Anas crecca*, *Anas platyrhynchos* and *Fulica atra*.

Akbar *et al.*, (2005-06) studied the waterfowl population at Head Qadirabad Wildlife Sanctuary from 1993 to 2004. They reported 86.7%, 77.07% and 86.1% decline in the population of *Aythya ferina*, *Anas crecca* and *Anas acuta* respectively but 100% increase in population of *Fulica atra* from 1993 to 2004.

Akbar *et al.*, (2006) studied the waterfowl population of Patisar Lake at Bahawalpur from 1996 to 2005. They recorded 32 species of waterfowl belonging to 19 genera from 10 families, whereas, 43 waterfowl species belonging to 27 genera from 10 families representing 6 orders were recorded in the present study. Maximum population of *Anas platyrhynchos* recorded by Akbar *et al.*, (2006) was 24.09% followed by *A. strepera* (12.18%) and *A. acuta* (11.69%).

Waterfowl survey is being conducted annually by different agencies involved in research. Scott (1989) reported 52,400 and 43,000 waterfowls were present in January 1987 and 1988 respectively at Rasool Barrage. If we compare the average annual population estimates with the average estimates of Scott (1989) for the year 1987 and 1988, it indicates that there is 81.5% decline in population of waterfowl at Rasool Barrage, during the last 18 years. The data given in table 1 explain that the waterfowl population has decreased too much due to illegal hunting, netting of waterfowl, livestock grazing, fishing and habitat degradation. Similar findings for the declining trend in various waterfowls in many regions of the world were observed by Houdkova (2003), Horn *et al.*, (2008), Phillips (2008) and Martarano and Yparraguirre (2008).

It is concluded that Rasool Barrage in its present state has failed to provide safeguard to wild fauna and there is urgent need to safeguard the over all biodiversity of Rasool Barrage through management planning of the area.

In order to protect the ecosystem and avifauna of the area following acts are suggested.

- Illegal hunting and netting of waterfowl should be strictly controlled through deployment of sufficient and well armed staff.
- Habitat of the area should be protected by controlling vegetation exploitation.
- Livestock grazing must be effectively controlled.
- Public awareness about the local environment problems should be promoted through publicity campaigns, brochures, boards etc at local level.
- Local community should be involved in management of the area through registration of community based organizations.

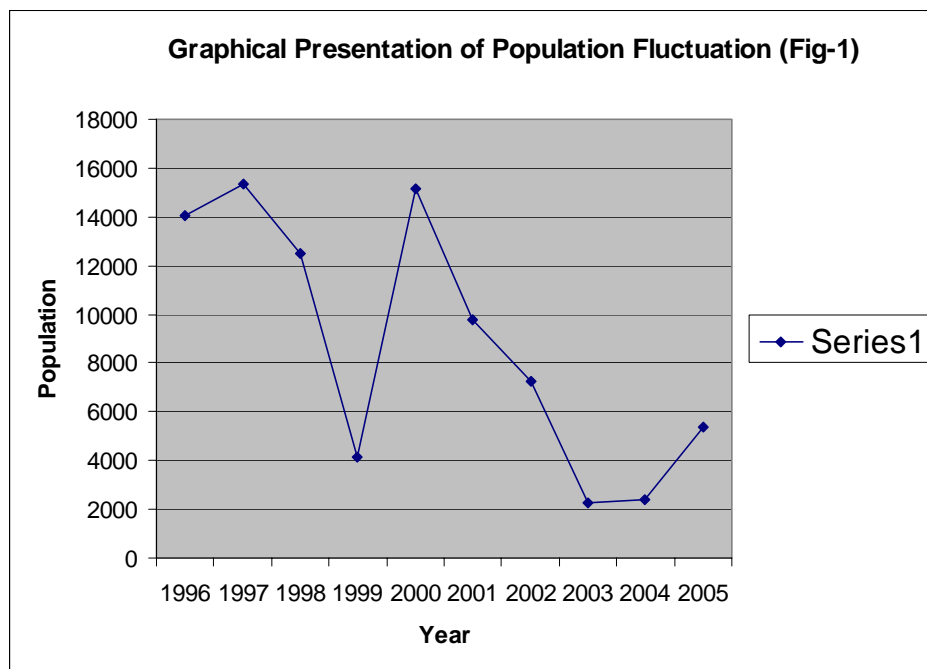


Fig. 1. Graphical presentation of population fluctuation

Order	Family	Common Name	Scientific Name	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total	Percent
Podicipediformes	Podicipedidae	Little grebe	<i>Tachybaptus ruficollis</i> (PALLAS, 1764)	11	83	38	40	53	30			23	16	294	0.333
		Great crested grebe	<i>Podiceps cristatus</i> (LINNAEUS, 1758)	1				12			1				14
Pelecaniformes	Phalacrocoracidae	Great cormorant	<i>Phalacrocorax carbo</i> (LINNAEUS, 1758)		822	52		185	65	152		285	50	1611	1.824
		Little cormorant	<i>Phalacrocorax niger</i> (VIEILLOT, 1817)	455	18	129	250	280	803	280					2215
Ciconiiformes	Ardeidae	Cattle egret	<i>Bubulcus ibis</i> (LINNAEUS, 1758)		242	57		140	175	119	360	53		1146	1.297
		Great egret	<i>Egretta alba</i> (LINNAEUS, 1758)	93	43	18		19			31	12	17		233
		Intermediate egret	<i>Egretta intermedia</i> (WAGLER, 1829)				80		46	6	180	7	113	432	0.489
		Little egret	<i>Egretta garzetta</i> (LINNAEUS, 1766)	178	363	94	300	250	137	85	436	120	220	2183	2.471
		Purple heron	<i>Ardea purpurea</i> (LINNAEUS, 1766)	46	79	26		17			8	3		179	0.203
		Grey heron	<i>Ardea cinerea</i> (LINNAEUS, 1758)	58	213	39	24	87	26	57	43	13	54	614	0.695
		Indian pond heron	<i>Ardeola grayii</i> (SYKES, 1832)	60	147	163	10	37	12		87	172	20	708	0.802
	Ciconidae	Black stork	<i>Ciconia nigra</i> (LINNAEUS, 1758)	1			50	12						63	0.071
		Black-necked stork	<i>Ephippiorhynchus asiaticus</i> (LATHAM, 1790)		13				2		5				20
Anseriformes	Anatidae	Ruddy shelduck	<i>Tadorna ferruginea</i> (PALLAS, 1764)	4		5			2					11	0.012
		Eurasian wigeon	<i>Anas penelope</i> (LINNAEUS, 1758)		1071	1190	80	960	200	490	16	87	150		4244
		Gadwal	<i>Anas strepera</i> (LINNAEUS, 1758)		428	176	120		1000	13				1737	1.967
		Mallard	<i>Anas platyrhynchos</i> (LINNAEUS, 1758)	8659	2088	1700	600	2700	3476	450	87	360	200	20320	23.005
		Common teal	<i>Anas crecca</i> (LINNAEUS, 1758)	1460	3163	2170	1000	1350	243	1540	163	420		11509	13.030
		Northern pintail	<i>Anas acuta</i> (LINNAEUS, 1758)	1093	1153	850	1000	4850	1200	670		180	1430	12426	14.068
		Northern shoveler	<i>Anas clypeata</i> (LINNAEUS, 1758)	614	690	1260	200	1970	1500	125		163	850	7372	8.346
		Tufted duck	<i>Aythya fuligula</i> (LINNAEUS, 1758)	1	57				2	20				80	0.091
		Ferruginous duck	<i>Aythya nyroca</i> (GULDENSTADT, 1769)		146			1480	138	260				2024	2.291
		Common pochard	<i>Aythya ferina</i> (LINNAEUS, 1758)		1811	2150			109	900	170	250	1500	6890	7.801
		Red crested pochard	<i>Netta rufina</i> (PALLAS, 1773)	170	550	450	5		3					1178	1.334
Gruiformes	Rallidae	Common coot	<i>Fulica atra</i> (LINNAEUS, 1758)	280	1055	1750	100	89	85	1900	173	170	620	6222	7.044
		White-breasted water hen	<i>Amaurornis phoenicurus</i> (PENNANT, 1769)		127			21		27	18				193
		Moor hen	<i>Gallinula chloropus</i> (LINNAEUS, 1758)	44	92	31	165	52	32	14			12	442	0.500
		Purple swamp hen	<i>Porphyrio porphyrio</i> (LINNAEUS, 1758)	566	239	35	100	87	18	5	37		90	1177	1.333
Charadriiformes	Recurvirostridae	Black-winged stilt	<i>Himantopus himantopus</i> (LINNAEUS, 1758)	9	17		22		24	37	17			126	0.143
		Avocet	<i>Recurvirostra avosetta</i> (LINNAEUS, 1758)		18		5		3		7				33
	Charadriidae	Little ringed plover	<i>Charadrius dubius</i> (SCOPOLI, 1786)	25	67	38			17		315			462	0.523
		Northern lapwing	<i>Vanellus vanellus</i> (LINNAEUS, 1758)	17	13					7	21				58
		Red wattled lapwing	<i>Vanellus indicus</i> (BODDAERT, 1783)	12	51		6	31	8			27		135	0.153
		White-tailed plover	<i>Vanellus leucurus</i> (LICHTENSTEIN, 1823)		6									6	0.007
	Scolopacidae	Green shank	<i>Tringa nebularia</i> (GUNNERUS, 1767)	21	21	9		27	4	12	15			109	0.123
		Red shank	<i>Tringa totanus</i> (LINNAEUS, 1758)	39	38	14		18		6	27			142	0.161
		Little stint	<i>Calidris minuta</i> (LEISLER, 1812)	38	19				45					102	0.115
		Common sand piper	<i>Actitis hypoleucos</i> (LINNAEUS, 1758)	46	63	29		65	14	18	47	33		315	0.357
		Fantail snipe	<i>Gallinago gallinago</i> (LINNAEUS, 1758)		71									71	0.080
	Laridae	Indian river tern	<i>Sterna aurantia</i> (GRAY, 1831)	13	187	21		114	60	29	18	17		459	0.520
		Great black-headed gull	<i>Larus ichthyaetus</i> (PALLAS, 1773)					41	56						97
		Herring gull	<i>Larus argentatus</i> (PONTOPPIDAN, 1763)					63	70					133	0.151
		Black-headed gull	<i>Larus ridibundus</i> (LINNAEUS, 1766)	31	76			170	195	25		5	40	542	0.614
		Total:		14045	15340	12494	4157	15180	9800	7278	2263	2405	5365	88327	
		Percent		15.90	17.37	14.15	4.71	17.19	11.10	8.24	2.56	2.72	6.07		

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