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Patterns of seasonal abundance and diversity in waterbird community of Padav Talav (Pond), near Nagbhid Maharashtra, India

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ABSTRACT

The study area, Pandav Talav (Pond) near Nagbhid (20º34'52.32"N and longitude 79 º39'02.27"E) is a water reservoir, located within newly approved Ghodazari Sanctuary by Government of Maharashtra. In the present survey on waterbird community at Pandav Talav (pond) spanning the period from November 2022 to October 2023, 2343 individuals were recorded which belongs to 41 species, 13 families and 6 orders. Recorded waterbird community shows seasonal fluctuations, maximum 41 species recorded during winter season (Nov-Feb.) followed by summer (40) while monsoon season recorded minimal 30 species. The study site although having ideal fresh water habitat due to its large shallow shoreline exposed during winter and summer, species richness of migratory waders were found impacted by the human interference in the form clay brick production activities, started in the month of October till the end of April. Aquatic habitat available to mud probing wetland bird community impacted by the enormous growth of *Ipomea aquatica* shrub but that provides suitable foraging guild for family-Raliidae. The first record sighting of Baillon's Crake, *Zapornia pusilla* at this site amidst reeds of Ipomea aquatica was sufficient to attract conservational measures to preserve this wetland. Present study will helps in designing conservation strategy as this agro-forest ecosystem posing threat by grazing, forest fires during summer, poaching of birds and man-animal conflict and hence requires immediate attention.

Keywords – Waterbird, Baillon's Crake, Ardeidae, Charadiformes, Scolopacidae

INTRODUCTION

Wetlands are important conservation sites due to their rich biodiversity, they are among the most productive ecosystems in the world, anSd they harbor many globally threatened species. (Green, 1995; Ramsar Convention, 2016). Diverse wetland complexes are of greatest value in providing habitat for wetland bird species. (Gregory,

2003). The birds inhabiting in and around water reservoir and dependent on wetland directly or indirectly for feeding, breeding, nesting or roosting are commonly called as water birds or wetland birds (Ramsar Convention, 2016; Kumar and Gupta, 2013). They forage on small invertebrates and vertebrates and other benthic organisms. (Nirmal Kumar, et al., 2014). Loss of wetlands in recent decade due to intensification of anthropogenic activities like fishing, commercial cultivation of hydrophytes, deposition of domestic waste and agricultural runoff has been posing serious threat to the wetlands and water birds. (Zedler and Kercher, 2005; Nirmal Kumar et al, 2007; Dar and Dar, 2009).

Wetlands in India account for 18.4% of the country's geographic area, of which 70% is under paddy cultivation (Parekh & Gadhvi 2013). Water bird communities have been studied fairly well in India (Arunkumar, et al., 2005; Bhattacharjee and Bergali, 2012; Kumar & Gupta, 2013; Quodros, G., 2016; Chattterjee, et al., 2020; Jamwal, et al., 2020). India checklist reported 310 wetland birds, out of which 243 are water birds and 67 are wetland associated birds. (Arunkumar, et al., 2005). Past studies documented water bird community of Maharashtra, mostly in Western Ghat (Balkhande et al., 2012; Kumbhar and Ghatge., 2014; Adhikari, 2019), in Vidarbha by Chitampally, 1993; Wagh, *et al*., 2015; Bayani & Dandekar, 2017). Most of the study pertaining to diversity of avifauna in this eastern part of the Vidarbha (Maharashtra) carried out in protected forests like Tadoba-Andhari Tiger Reserve (TATR), Nagzira Wildlife Sanctuary and Karhandla Wildlife Sanctuary, Umred. (Bayani & Dandekar, 2017).

An effort to conserve wetland habitats are hampered by a paucity of biological data (Streeter et al, 1993; Shuford et al, 2004). There is a paucity of studies on the diversity of birds in the non-protected areas of Chandrapur, Bhandara and Gadchiroli district of Maharashtra which is known for dense moist semi-deciduous forest interspersed with freshwater habitats, ponds, lakes and paddy fields. To address this data gap, we had conducted survey on the Pandav Talav (Pond) to study the fluctuations in the abundance of water birds during different seasons in order to plan conservation strategy of this wonderful wetland.

2. MATERIAL AND METHODS

The study area, Pandav Talav (Pond) near Nagbhid (20º34'52.32"N and longitude 79 º39'02.27"E) is a water reservoir, located within newly approved Ghodazari Sanctuary by Government of Maharashtra. (Fig.1) Preliminary bird survey of bird community was carried out during November 2022 to October 2023. The avian survey was conducted in 1sq. km perimeter by monthly visit to the study area. Eight sampling sites with radius of 500m had been randomly selected in the study area. (Fig.1) According to point transect method for sampling of birds. (Bibby *et al.* 2000) Birds recorded from eight point transects, observed by Olympus 118760 10x50 DPSI Wide-Angle Binocular and wherever possible photographed by digital camera Canon EOS 200D. The identification of birds was done as per the photographic guides to the birds of India (Ali and Ripley, 2001; Grimmett *et. al*., 2011). Qualitative data on threats to vegetation and birds were also gathered throughout the study period. (Fig.2)

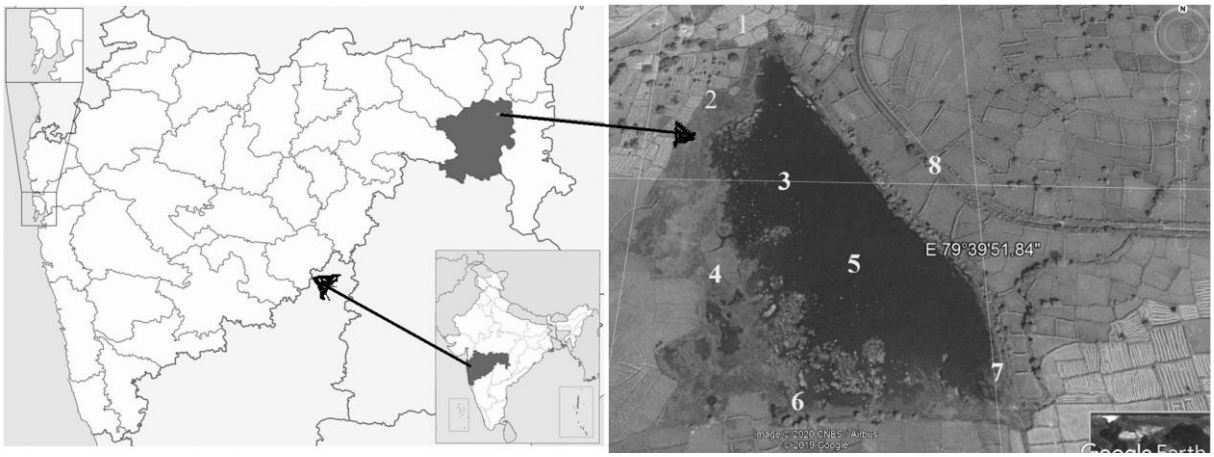

Fig. 1 Location Map of Study site Pandav Talav (Pond)

Fig. 2: Photo of Padav Talav (Pond) showing different habitat. A: Open water with lesser Whistling duck, B: Black crowned Night Heron on Vachelia nilitica tree, C: Baillon Crake amidst reeds, D: Purple Heron on Mudflat

3. RESULTS

In the present survey on waterbird community at Pandav Talav (pond) spanning the period from November 2022 to October 2023, 2343 individuals were recorded which belongs to 41 species, 13 families and 6 orders. Recorded waterbird community shows seasonal fluctuations, maximum 41 species recorded during winter season (Nov-Feb.) followed by summer (40) while monsoon season recorded minimal 30 species. (Table.1).

Table 1. Checklist of waterbird community recorded at the Pandav Pond.

Sr. N.	Common Name	Zoological Name	Winter (Nov-Feb)		Summer (Mar-Jun)		Monsoon (Jul-Oct)		Res. Status	For. Guild	I UCN	Sightings
			Count	Mean Abundance	Count	Mean Abundance	Count	Abundance				
Order - Ciconiformes												
Family - Ciconidae												
1	Wooly Necked Stork	*Ciconia episcopus*	6	0.53050397	0	0	0	0	R/LM/SM	P	**NT**	UCom
2	Asian Openbill Stork	*Anastomus oscitans*	49	4.33244916	23	4.0925266	38	5.8461538	R/LM/SM	P,C	LC	Com
Order - Pelicaniformes												
Family - Ardeidae												
3	Purple Heron	Ardea pupurea	16	1.41467727	7	1.2455516	15	2.3076923	R/LM/WM	P,I	LC	UCom
4	Grey Heron	*Ardea cinerea*	12	1.06100795	5	0.8896797	9	1.3846153	R/LM/WM	P,I	LC	Com
5	Indian Pond Heron	*Ardea grayii*	19	1.67992926	12	2.1352313	17	2.6153846	R	P	LC	VCom
6	Black Crowned Night Heron	*Nycticorax nycticorax*	78	6.89655172	70	12.455516	89	13.692307	R/LM	P	LC	VCom
7	Cattle Egret	*Bubulcus ibis*	39	3.44827586	26	4.6263345	45	6.9230769	R	I	LC	VCom
8	Little Egret	*Egretta garxetta*	28	2.47568523	18	3.2028469	21	3.2307692	R/LM	P	LC	VCom
9	Large Egret	*Casmerodius albus*	14	1.23784261	10	1.7793594	12	1.8461538	R/LM/SM	P,C	LC	Com
10	Intermediate Egret	*Ardea intermedia*	9	0.79575596	6	1.0676156	2	0.3076923	R/LM/SM	P	LC	Com
Family - Threskiornithidae												
11	Black Headed Ibis	*Threskiornis melanocephalus*	36	3.18302387	12	2.1352313	29	4.4615384	R/WM/SM	P	**NT**	Com
12	Red Naped Black Ibis	*Pseudibis papilosa*	19	1.67992926	11	1.9572953	15	2.3076923	R/LM	P	LC	VCom
Order - Suliformes												
Family - Phalacocrocoracidae												
13	Little Cormorant	*Phalacrocorax niger*	46	4.06719717	19	3.3807829	29	4.4615384	R/LM	P	LC	VCom
14	Indian Cormorant	*Phalacrocorax fuscicollis*	9	0.79575596	3	0.5338078	0	0	R/LM	P	LC	UCom
Family - Anhingidae												
15	Darter	*Anhinga melanogaster*	18	1.59151193	12	2.1352313	17	2.6153846	R/WM/SM	P	**NT**	Com
Order - Gruiiformes												
Family - Raliidae												
16	White Breasted Waterhen	*Amaurornis phoenicurus*	34	3.00618921	15	2.6690391	16	2.4615384	R	O	LC	UCom
17	Eurasian Coot	*Fulica atra*	54	4.77453580	23	4.0925266	0	0	WM	O	LC	UCom
18	Baillion's Crake	*Zapornia pusilla*	19	1.67992926	8	1.4234875	0	0	WM	O	LC	Ra
19	Common Moorhen	*Gallinula chloropus*	26	2.29885057	21	3.7366548	33	5.0769230	R	O	LC	Com
20	Grey Headed Swamphen	*Porphyrio poliocephalus*	37	3.27144120	18	3.2028469	34	5.2307692	R/LM	O	LC	Com
Order - Charadiiformes												
Family - Charadriidae												
21	Little Ringed Plover	*Charadrius dubios*	35	3.09460654	15	2.6690391	29	4.4615384	R/LM	I	LC	Com
22	Red Wattled Lapwing	*Vanellius indicus*	29	2.56410256	12	2.1352313	19	2.9230769	R	C,I	LC	Vcom

Family - Scolopacidae												
23	Temminck's Stint	*Calidris temminckii*	28	2.47568523	17	3.0249110	0	0	WM	I	LC	UCom
24	Little Stint	*Calidris minuta*	17	1.50309460	3	0.5338078	0	0	WM	I	LC	UCom
25	Common Snipe	*Gallinago gallinago*	19	1.67992926	9	1.6014234	12	1.8461538	R/WM/SM	I	LC	UCom
26	Pintailed Snipe	*Gallinago sternura*	21	1.85676392	8	1.4234875	14	2.1538461	R/WM/SM	I	LC	Com
27	Spotted Redshank	*Tringa erythropus*	25	2.21043324	7	1.2455516	0	0	WM	C,I	LC	UCom
28	Green Sandpiper	*Tringa ochropus*	28	2.47568523	9	1.6014234	0	0	WM	C,I	LC	Ra
29	Wood Sandpiper	*Tringa glareola*	8	0.70733863	5	0.8896797	6	0.9230769	R/LM/WM	C	LC	Com
30	Marsh Sandpiper	*Tringa stagnatilis*	5	0.44208664	2	0.3558718	0	0	WM	I	LC	Ra
31	Common Sandpiper	*Actius hypoleucos*	13	1.14942528	5	0.8896797	7	1.0769230	WM	C	LC	Ra
Family -Jacanidae												
32	Bronze Winged Jacana	Metopodius indicus	24	2.12201591	12	2.1352313	17	2.6153846	R/LM	O	LC	Com
33	Pheasant Tailed Jacana	*Hydrophasianus chirugus*	18	1.59151193	11	1.9572953	14	2.1538461	R/LM	O	LC	Com
Family - Rostratulidae												
34	Greater Painted Snipe	*Rostratula benghalensis*	18	1.59151193	12	2.1352313	11	1.6923076	R/WM/SM	C	LC	Com
Family - Laridae												
35	River Tern	*Sterna aurantia*	15	1.32625994	9	1.6014234	10	1.5384615	R/LM	P,C	**Vu**	Com
Family - Recurvirostridae												
36	Black Winged Stilt	*Himantopus himantopus*	12	1.06100795	8	1.4234875	3	0.4615384	WM	C,I	LC	UCom
Order - Anseriformes												
Family - Anatidae												
37	Lesser Whistling Duck	*Dedrocigna javanica*	56	4.95137046	25	4.4483985	29	4.4615384	R/LM/WM	H	LC	Vcom
38	Gadwall	*Mareca strepera*	34	3.00618921	13	2.3131672	0	0	WM	H	LC	UCom
39	Indian Spot Billed Duck	*Anas poecillorhyncha*	45	3.97877984	15	2.6690391	23	3.5384615	R/LM/WM	H	LC	Com
40	Northern Pintail	*Anas acuta*	65	5.74712643	25	4.4483985	0	0	WM	H	LC	UCom
41	Common Pygmy Goose	*Nettapus coromandlianus*	48	4.24403183	21	3.7366548	35	5.3846153	R/LM/WM	H	LC	Com

Where, R-Resident, LM-Local Migrant, R/LM/SM –Local Migrant with summer influx, R/LM/WM – Local Migrant with winter influx, WM – Winter Migrant, H – Herbivorous, C- Carnivorous, P – Piscivorous , P, C- Piscivorous and Carnivorous, I – Insectivorous, LC – Least Concern, Vu – Vulnerable, NT – Near Threatened, Com – Common, UCom – Uncommon, VCom – Very Common, Ra - Rare

Table 2: Abundance of Waterbirds

Sr. No.	Waterbird Order	Winter (Nov-Feb)		Summer (Mar-Jun)		Monsoon (Jul-Oct)	
		Count	Abundance	Count	Abundance	Count	Abundance
1	Ciconiformes	55	4.862953	23	4.09252669	38	5.8461538
2	Pelicaniformes	270	23.87267	177	31.49466192	254	39.076923
3	Suliformes	73	6.454465	34	6.049822064	46	7.0769231
4	Gruiiformes	170	15.03094	85	15.12455516	83	12.769231
5	Charadiiformes	315	27.85145	144	25.6227758	142	21.846154
6	Anseriformes	248	21.92749	99	17.61565836	87	13.384615

Sr. No.	Waterbird Family	Winter (Nov-Feb)		Summer (Mar-Jun)		Monsoon (Jul-Oct)	
		Count	Abundance	Count	Abundance	Count	Abundance
1.	Ciconidae	55	4.862953	23	4.092526	38	5.846153
2.	Ardeidae	215	19.009725	154	27.402135	210	32.30769
3.	Threskiornithidae	55	4.862953	23	4.092526	44	6.769230
4.	Phalacocrocoracidae	55	4.862953	22	3.914590	29	4.461538
5.	Anhingidae	18	1.591511	12	2.135231	17	2.615384
6.	Raliidae	170	15.030946	85	15.124555	83	12.76923
7.	Charadriidae	64	5.658709	27	4.804270	48	7.384615
8.	Scolopacidae	164	14.500442	65	11.565836	39	6
9.	Jacanidae	42	3.713527	23	4.092526	31	4.769230
10.	Rostratulidae	18	1.591512	12	2.135231	11	1.692307
11.	Laridae	15	1.326260	9	1.601423	10	1.538461
12.	Recurvirostridae	12	1.0610080	8	1.423487	3	0.461538
13.	Anatidae	248	21.927498	99	17.615658	87	13.384615

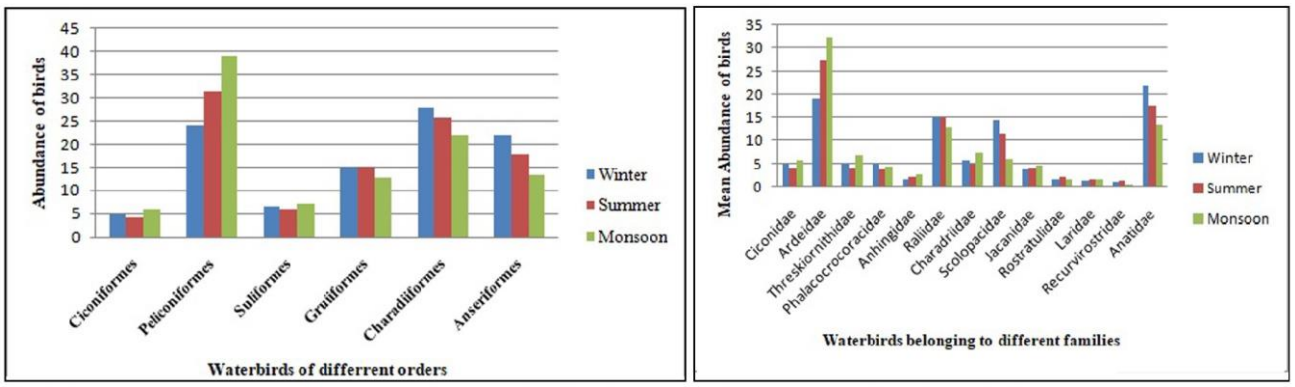

Fig. 3 Graphs Showing Seasonal fluctuations in waterbirds community of Pandav Talav (Pond)
A: Abundance of Waterbirds of different orders B. Abusndabce of different families

Data on mean abundance of different species of waterbird community reveals that, Brown Headed Night Heron recorded maximum abundance throughout all the seasons. During winter season it is followed by Northern Pintail (5.74) and Lesser Whistling Duck (4.95), in summer, followed by Cattle Egret (4.62) and Lesser Whistling Duck (4.46), and while in monsoon, it is followed by Cattle Egret (6.92) and Asian Openbill Stork (5.84). Mean abundance of Black Crowned Night Heron peaked during monsoon season (13.69) followed by summer (12.45) and winter (6.90). (Table.1)

Present investigation on the seasonal fluctuations of waterbird community at Pandav Talav (Pond) indicates that, total count of water birds peaked during winter season (1131) followed by the monsoon (650) and summer season (562) that is, overall 49.69 % decline in waterbird community from winter to summer that is followed enrichment of about 13.54% waterbird community during monsoon season. Mean abundance of waterbird community fluctuates during different seasons, waterbirds belonging to Order – Charadiiformes recorded maximum abundance (28%) followed by Pelicaniformes (24%) and Anseriformes (22%). (Fig.3). These gradients in abundance of waterbird community slightly change during summer and monsoon seasons, as order-Peliconiformes recorded maximum abundance, that is 31% and 39% respectively followed by Charadiiformes (26 and 22% respectively). Waterbird community belonging to different families recorded seasonal fluctuations, family-Anatidae recorded maximum abundance (22%) followed by Ardeidae (19%) and Raliidae (15%). During summer and monsoon season, family-Ardeidae shows maximum abundance (27% and 32% respectively) followed by Anatidae and Raliidae. (Fig.3),

DISCUSSION

Ecosystem of local area impacted composition of bird community and their foraging guild (Gregory, *et al.,* 2003; Bhagvat, *et al*., 2008; Karanth, et al., 2016). Insects plays important role as a consumer of organic waste and serve as a food for fishes (Nirmal kumar, et al., 2007) The dominance of piscivorous birds (25%) in the present investigation of foraging guild of waterbirds authenticate the same. During present investigation on water birds of Pandav Talav (Pond) which represents freshwater habitat wetland dominated by typical marsh habitat dominated by *Ipomea aquatica*, seasonal fluctuations were observed along the different orders, families, and foraging guild structure of water birds. These fluctuations along different gradients, due to the change in season correlated with the change in food resources, configuration of habitat, available surface area (Goss-Custard, et al., 1995; McParland and Paszkowski, 2007). With the onset of winter there was influx of waders from order – Charadiformes, mostly due to exposure of mudflat having plenty of organic matter got available for mud probing waders. (Manikannan et al, 2012). Water birds from family – Anatidae like Northern Pintail and Gadwal migrates to roosting ground in large numbers during winters due to the fact that paddy fields after *kharip* harvest acts as perfect night roosting ground. (Sundar and Subramanya, 2010; Parejo et al. 2019). Such group of waders may be considered as wetland bio-indicators for an accurate assessment of the health of a particular wetland. (Green, 1995). The change in habitat surface, the amount and type of food resources available to water birds during the different seasons affects their foraging guild and community structure. (Nirmal Kumar, et al., 2007). In the same way proximity of human habitation to the water body and their interference also contributes to the disturbance to foraging waders on the mudflats and on hydrophytes. (Masero, et al., 2000).

The differences among different orders and families at this study site related to their position along fresh water gradients, habitat types and human land use in the vicinity. (Ericia et al, 2005). During our study, some water birds like Lesser Whistling Duck shows very distinct peaks during winter, Cattle Egret during summer and Little Cormorant during monsoon representative of particular foraging guild related with the plenty of food available in the fresh water habitat. In case of these dominant species, our investigation revealed that certain species like Lesser Whisling Duck along with other large water birds from Family-Ardeidae and Phalacrocoracidae reached their peak numbers but gradually their density declines during monsoon season could be related to the low water depth and availability of exposed mudflat island (Masero et al, 2000). During monsoon season, Family – Jacanidae peaked in abundance as the habitat covered with vegetation dominated by commercially cultivated water Chestnut, *Trapa natans* and *Nelumbo nucifera* provides ideal breeding ground for both Bronze Winged Jacana and Pheasant Tailed Jacana. Similar findings reported in elsewhere in India. (Gopi & Pandav, 2007; Chatterjee et al, 2020).

The study site although having ideal fresh water habitat due to its large shallow shoreline exposed during winter and summer, species richness of migratory waders were found impacted by the human interference in the form clay brick production activities, started in the month of October till the end of April resulted into absence of winter migratory ducks with exceptions of Gadwal and Northern Pintail.

(Goss-Custard et al 1995; Green, 1996). Apart from this, habitat come under heavy human interference due to the vicinity of human settlements on encroached land by most of the working class labourers Nagbhid town, it has been utilized for washing of cloths, domestic animals, deposition of waste from households were found to be major anthropogenic stresses noticed during the study period. (Kar and Debata, 2019). Aquatic habitat available to mud probing wetland bird community further impacted by the enormous growth of *Ipomea aquatica* shrub but that provides suitable foraging guild for family-Raliidae. (Blann, 2009). The sighting of Baillon's Crake, Zapornia pusilla amidst the marsh habitat pf pandav Talav dominated by reeds alongwith emergent and submerged hydrophytes is sufficient to assume the importance of this habitat from the conservation point of view. Earlier this species reported in Vidarbha region of Maharashtra by Kasambe and Wadatkar (2007), apart from this very few sightings of Baillon's Crake reported from India. Developing effective measures for conservation of water birds in Pandav Talav (Pond) depends critically on understanding current status. In this regard present study might be considered as fundamental step for the protection of water birds in Pandav Talav. Present study will helps in designing conservation strategy as this agro-forest ecosystem posing threat by grazing, forest fires during summer, poaching of birds and man-animal conflict and hence requires immediate attention.

CONCLUSION

The study site although having ideal fresh water habitat due to its large shallow shoreline exposed during winter and summer, species richness of migratory waders were found impacted by the human interference in the form clay brick production activities, started in the month of October till the end of April resulted into absence of winter migratory ducks with exceptions of Gadwal and Northern Pintail. Apart from this, habitat come under heavy human interference due to the vicinity of human settlements on encroached land by most of the working class labourers Nagbhid town, it has been utilized for washing of cloths, domestic animals, deposition of waste from households were found to be major anthropogenic stresses noticed during the study period. Aquatic habitat available to mud probing wetland bird community further impacted by the enormous growth of *Ipomea aquatica* shrub but that provides suitable foraging guild for family-Raliidae. The sighting of Baillon's Crake, Zapornia pusilla amidst the marsh habitat pf pandav Talav dominated by reeds alongwith emergent and submerged hydrophytes is sufficient to assume the importance of this habitat from the conservation point of view.

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