

STATUS OF FAMILY RALLIDAE IN SOLAPUR (MS), INDIA.

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Abstract

Crakes are very secretive birds among land dwelling winged groups. Their occurrence, exact distributional range and population dynamics was the problem statement. Although, we here tried to focus on sites and locations with their residential status. Status of family Rallidae during 2014 in and around Solapur. On the other hand structure of complex community assemblage at selected three sites was also elucidated. Head counts of each species indicate the fluctuation among all members. It leads to framing important value index of their community ecology. Additionally, this study also comes to enlighten some analogous sites where presence of Rallidae members has been sighted. This study will supports to subtle group of Aves which was considered obviously.

Keywords: Deccan, Distribution, Rallidae, Solapur, Status.

Introduction

Nicholas Aylward Vigors (1785-1840) was an Iris zoologist who described certain birds of similar morphological characters and counted them in an envelope called Rallidae: Aves: Gruiformes. He described more than hundreds of feathered species between several families and Rallidae is one among them (Alfred 1878). In its upper grade of classification, Gruiformes an order of large flying as well as land dwelling birds like Cranes and Rails etc. Apart from Antarctica Rallidae members are found in all continents. Gruiformes comprises five avian families in entire Indian subcontinent (Manakadan & Pittie 2001). Except Heliornithidae remained all four exists their appearance in Solapur (Vanjari *et. al.*, 2014). Seventeen species of family Rallidae were belongs to Indian subcontinent (Grimmett *et. al.*, 2010) while thirteen species recorded from state Maharashtra (Pande 2011). Rails and Crakes dwelling earth from Oligocene period of geological time, more than the hundreds of species has been distributed worldwide (Taylor & Van 1998). Several species were extinct in last century (Haude 2009, Olson 1985). During the centuries worldwide ornithologist engaged in understanding the natural history of these elusive species. Few aspects of their life cycle are illustrated but still there are numerous bits need to handle. Wetlands are home of these all members depending on water depth, its quality, availability of food and surrounding floral pattern is quite interesting and unique. They breed during spring and summer in temperate region and during wet season in tropics (Hoyo *et.al.*, 1996). Fundamental aspects regarding these comparatively less studied group of birds needs warm and urgent focus. Review of previous work point outs; very few literatures on ecological bits of Rallidae were studied in India. It also indicates lacking of serious attempts to study this secretive family. Here we conducted simple observational method, it reflects into numerical form of indices. So, present study is objected to understand the baseline information through its status in and around Solapur, Maharashtra, India.

Methods and Material

The present study comes under south region of Maharashtra state in Deccan plateau. Vegetation of this land is semi-arid, thorny forests, open scrubland, chiefly grassland cover, sporadic marshy patches and southern tropical thorny forests (Champion and Seth 1968).

Floral picture is predominantly Xerophytic forest, thorny leguminous species predominate trees with short and law branches, spiny with few limbers (Sargreiya 2000). As per Raunkiaer's (1934) classification this region covered with the Rophacherophytic plant community. Arboreal vegetation of municipal corporation area along Bheema river transit is rich (Suryavanshi and Bachulkar (2011). The entire district lies into Bheema-Sina river basins bounded between 17°14'to 18°32'N latitude and 74°42' to 76°15' E longitude, at 455m above MSL. Average temperature and humidity during the study period 17°C-35°C and 55-85% respectively. We selected three sites initially viz. Hipparga Lake (H), Sambhaji Lake (S) and Degaon (D) during January 2014- December 2014. Next to observe the habitat site preference of birds for comparative analysis and to understand primary distribution we surveyed twelve more analogous spots in and around Solapur on the observable basis of one site per week randomly. Point count method of census was followed for data collection (Sutherland, 2006). In addition to this due to presence of twelve species verses many site population statistical calculations have taken in account. According to Curtis & McIntosh (1950) Important Value Index were calculated which can give a single quantitative figure of occurrence of whole family. To study the Community structure of these species were also undertaken (Krebs, 1972). For better understanding about every family member, prior diversity indices (Magurran 1988) and β diversity indices were studied (Koleff *et. al.*, 2003). All statistical analysis of diversity indices were calculated with software program PAST (Hammer *et. al.*, 2001).

Results

Table 1 Checklist of Rallidae birds with observations

Sr. No.	Name	Site	Activity	Residential status	Duration
1	White-breasted Waterhen <i>Amauornis phoenicurus</i>	H,S,D	Breeding, Feeding	R / LM	Throughout year
2	Purple Swamphen <i>Porphyrio porphyrio</i>	H,S,D	Breeding	R	Throughout year
3	Common Moorhen <i>Gallinula chloropus</i>	H,S,D	Breeding	LM	Throughout year
4	Common Coot <i>Fulica atra</i>	H,S,D	Breeding	R	Except April-June
5	Spotted Crake <i>Porzana porzana</i>	D	Feeding	M	December-May
6	Little Crake <i>Porzana parva</i>	D	Feeding	M	February
7	Baillon's Crake <i>Porzana pusilla</i>	D	Feeding	M	November-April
8	Ruddy Breasted Crake <i>Porzana fusca</i>	S,D	Calling, Breeding	LM	S] November- December D] December-April
9	Brown Crake <i>Amauornis akool</i>	S,D	Sighting	R	S] October-December D] June-July
10	Watercock <i>Gallixrex cinerea</i>	D	Sighting	M	D] October
11	Water Rail <i>Rallus aquaticus</i>	S,D	Sighting	M	S] October-December D] November
12	Blue Breasted Rail <i>Galliralus striatus</i>	S,D	Sighting, Feeding	R	S] June D] November

R-Resident, LM-Local Migrant, M-Migratory

Diversity and occurrence

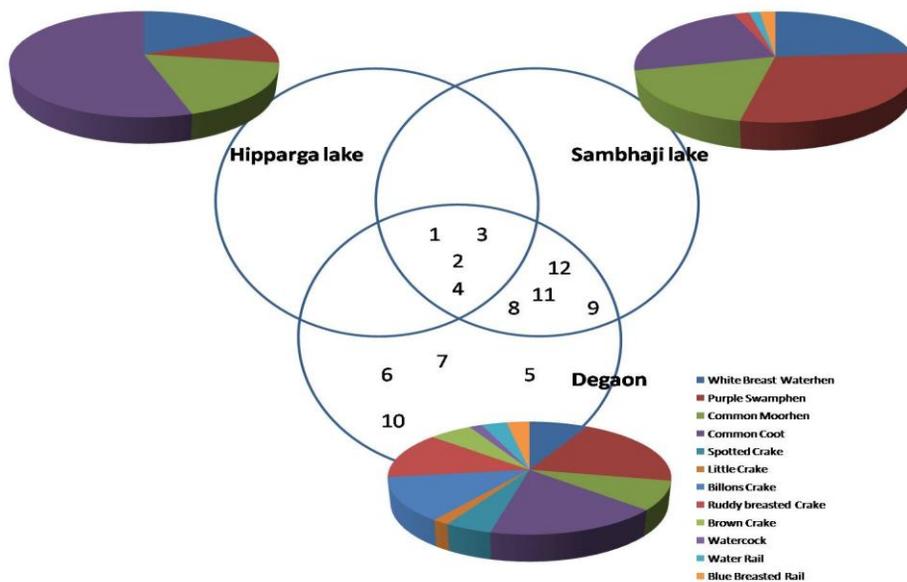
Present investigation revealed total twelve species among eight divers genera reported belonging to family Rallidae in Solapur. It is about 70.58% species out of all Rallidaen in Indian subcontinents. There is a twofold difference in site preference, activity during observation, most active period of their occurrence in a year and residential status is slightly different (Table: 1). Richness of species that acquiring the habitat was high at Degaon (Fig. 3D) site following Sambhaji and Hipparga lake. Although, spreading of these species and population is important to know about their land preference and its duration as well.

Statistical outcomes of moth wise distribution speak that, at Hipparga site from April to August was nearly constant; after it reduces up to December. At Sambhaji lake progressive results were obtained. The highest peak point occurrence was in November while reduced from January to April. In April and May at Degaon site a little birds were sighted. Gradually, it was ascending up to December.

Ecological Community of Rallidae

Community assemblage of Rallidae among three study sites showed by interconnected circles with percentages. White-breasted Waterhen *A. phoenicurus*, Purple Swamphen *P. porphyryo*, Common Moorhen *G. chloropus*, Common Coot *F. atra* occupied all sites but Spotted Crake *P. porzana* (Fig.3B), Little Crake *P. parva*, Baillon's Crake *P. pusilla* (Fig. 3A), Watercock *G. cinerea* were restricted to only Degaon site and Ruddy Breasted Crake *P. fusca*(Fig.3C), Brown Crake *A. akool*, Water Rail *R. aquaticus*, Blue Breasted Rail *G. striatus* in corporate with both Sambhaji lake and Degaon site (Fig. 1). It clearly shows that first four species are adaptable for all sites but in case of other species it changed. Their specialty was in different sites. Due to shallowness of water Degaon was high preferable to them. On the other hand, deep water depth, least floral background and high disturbance there were absence of numerous species at Hipparga.

Figure 1. Community assemblage of Rallidae at three sites.



Distinctness

Diversity indices between above all species in reported as Simpson ($=0.7862$) while Shannon ($H=2.1139$) (Table:2). On the other hand Common Coot *F. atra* have highest index of Density, Frequency and Abundance. While, Little Crake *P. parva* and Watercock *G. cinerea* has least. Totally, the Important Value Index of family Rallidae in all three study sites of Solapur is reported as ($=899.61$). It gives a clear picture of sociological status of species

in above family community. Density indices across the study sites have varied in occurrence of species as well as the dominance. However, comparative β diversities had various values in six different equations like Whittaker's (=0.56522), Harrison's (=0.05138), Cody's (=2.5) and Wilson-Shmida's (=1.3043).

Table 2 Diversity indices of birds of family Rallidae

Species	No. of indi.	%	Pi	Simpsons	Shanon pi
1	176	18.85	0.1885	0.0355	0.3145
2	195	20.87	0.2087	0.0435	0.3270
3	155	16.60	0.1660	0.0275	0.2980
4	521	26.88	0.2688	0.0722	0.3532
5	14	1.50	0.0150	0.0225	0.0284
6	5	0.54	0.0054	0.0000292	0.0281
7	38	4.06	0.0406	0.0001648	0.1300
8	47	5.03	0.0503	0.00253	0.1503
9	17	1.82	0.0182	0.000331	0.0729
10	5	0.54	0.054	0.00291	0.1576
11	15	1.60	0.0160	0.000256	0.0661
12	16	1.71	0.0170	0.005041	0.1878
Total	934	100	1	D=0.2140	H=2.1139
				1-D=0.7862	

Population Dynamics

Predominantly *F. atra*, *G. choropus*, *P. porphyrio* and *A. akool*, is common throughout the India. Here also frequency of these four species reported more frequently. Following *G. striatus*, *R. aquaticus* and *P. fusca* were lower while preceded by remaining species. Contrastingly, genus *Porzana* was least in all categories of population estimations.

Analogous distribution

Secondary but essential objective of this study to explore more twelve sites with general natural history observations. Sambhaji lake lies between roadway and railway. Highly polluted area near residential zone. But reserve ground covered with shrub like *Cassia tora*, *Malvastrum sp.* *Lantana camara* and grasses like *Brachiarea decumbens*, *Typha lotifolia*, *Cymbopogon martini* etc. Out of all the fourteen species of Rallidae seven were reported here. Neighbouring Vijapur road is unprotected marshland sided by large residential colonies and traffic (17°38'07"N 75°53'49"E). It is dominated by vegetation like *Typha lotifolia*, *Cynodon dactylon* and *Acacia arabica*. Yearly all it seems wet and sewage water is media by which it supports and being marshy. The occurrence of Rallidae birds were reported here as fair when they preferred this site for feeding and foraging. Bridge corners along with Pune road which is one of the busiest express road way in India which connects two metro cities via Solapur (17°41'32"N 75°52'57"E). But parallel to that (17°41'27E 75°53'58"E) there are some wet sites which supports the Rallidaen life. Identified by a large bridge below which a water stream carries the sewage of city from one part to another (17°41'14N 75°53'30"E). It is covered with numerous *Acacian* flora and grasses. Rather than Crakes, Brahminy Shelduck *Tadorna ferruginea*, a Heronary with breeding and sighting of Chestnut Bittern *Ixobrychus cinnamomeus* were also observed (17°41'30N 75°54'04"E).

According to observations, all the species of this family were reported at Degaon. Which did not at any other sites of high priority and analogous in Solapur which is quite remote. The amphibious grass *Typha lotifolia* is predominantly present, surrounding covered with shrubs of *Cassia tora*, *Zizipus jujuba*, and *Acacia* etc. and outside to that there were large agriculture land. The water current is periodically makes this site new but seasonally the grass and land becomes dry during summer. The depth of water is up to quarter of a meter in height. Ground is covered with merged and submerged shrubs, climbers which make net like mat formation on bottom which helps to hold the water and gives support for freshwater mollusks and aquatic insects. Ultimately, it is helpful for birds who share this habitat. Majarewadi site comes in south direction to town (17°37'60"N 75°55'18"E). Basically it is formed by trenches which can observable in current situation. In order to identify the site in present and future work intentionally it named here as it is by authors. It is also connected to locality but there is good grass height. Purple Moorhen *Porphyrio porphyrio* was reported frequently during feeding, calling while White-breasted Waterhen *Amaurornis phoenicurus* used to breed regularly. The water depth of this site is comparatively deep and many small soil dump formation was takes place and grass is succeed in developing over it. No doubt as the bird reported during its breeding then it was a proof sign of availability of food. Shelgi is Northern part of city (17°41'25"N 75°55'23"E) where significantly large site of marshes covered with thick complete grown amphibious grass *Typha lotifolia*. Due to present in road side the fluctuation of water current were seen at this site and it affects to the food. On Civil roadside the smallest area as compared to other all (17°39'24"N 75°55'11"E). No fluctuations in water content had been observed. Because there is only one way from water can come into trench and it percolates. There is no ground grass occurred because, it is totally covered with water and bounded by *Acacia* trees. Another part of this land is used as dump yard of garbage where the birds used to find their food and the trees for roosting. There were no reports of breeding record.

Siddheshwar Van Vihar is the only place where dense vegetation remained in Solapur (17°37'53"N 75°53'03"E). Where large trees, herbs, shrubs, climbers and many grasses has been examined. Situated in southern remote area of city. It is rich in many flowering plants and numerous insect species specifically Beetle (Coleoptera), Moths and Butterflies (Lepidoptera). In this mixed type of land there were a water body situated at centre bounded by large trees *Acacia catechu*, *Prosopis spingifera*, *Sesbernia sesban*, *Typha lotifolia* and *Zizipus jujuba* etc. where the bird species of Rallidae were frequently observed. In Akkalkot tehsil of southern part of district which this site is situated called Farit lake (17°37'05"N 76°09'34"E). The lake has deep and slope formed to its surrounding with reed beds. In which Rallidae bird sighted during foraging. No certain dense vegetation is covered. The occurrence of Brown Crake *Amaurornis akool*, Chestnut Bittern *Ixobrychus cinnamomeus* and Little Green Heron *Butorides striatus* also sighted during their feeding activity. No matter whatever the absence such dense aquatic grasses or plants or thick vegetation but this site is very remote in its area because, the main road way is far away from it. Hence, the disturbance is not as much. No such indication of pollution by sewage or any other mode. In order to huge area of a site Kurnur dam is one of the largest water body among study sites (17°36'55" N 76°13'02"E). Actually, the site place at back water of river line. Where the water steps to flow. Both the riverside are covered with agricultural lands. But the vegetation where Rallidae members were observed is covered with amphibious grass *Typha lotifolia* and *Acacia* trees. Water is covered with blue green algal sheath. Lastly, Hipperga lake is one of the large water body and percolation as well as popular tank in district. There is low reed shadow and submerged vegetation due to half of the area of lake attached to agriculture land and remained covered with road side. This is one of the favorite

points of roosting site of migratory birds to Deccan land. It provides largest venture for birds to settle. It is one of the high priority sites for Rallidae birds' species. Only there were four species reported. During to this birding on above sites habitat gives shelter and food for other mammalian and bird species associated with Rallidae too. Among them wild cat *Felis chaus* and Mongoose *Herpestes edwardsii* were observed. With this Purple Heron *Ardea purpurea* and its nesting, Red Munia *Amandava amandava*, Bluethroat *Luscinia svecica*, Red rump Swallow *Hirundo daurica*, Large Pied Wagtail *Motacilla maderaspatensis* and Painted Snipe *Rostratula benghalensis* were also reported.

Discussion

It is almost very important to report the status with its distribution at the grass root levels from habitat preference. Here we can see the small patches of high priority sites observed in study regions. Population dynamics of this family talks their abundance in Solapur as it is comes under rain shadow areas. Worldwide it is distributed in Indonesia, Philippines, Myanmar to entire west of India and Sri Lanka while winter visits to Malaysian islands. It breeds in Bengal July – September (Baker. 1929). Most of the breeding records were at non-perennial tanks with abundant growth of *Ipomoea* only at 60% of sites where the nest located while at other sites only coot cheeks were seen (Srinivasulu 1997). The Spotted crane is Palearctic migrant breeding in from Europe to Siberia and wintering in southern Europe and Africa. Spotted crane is reported in Nepal first time (Cooper 1991). They are rare breeding bird, favoring a small numbers of sites where suitable marshy lands exists. Even in fauna of British India by (Baker 1929) mentioned that it is not known to breed in India. On the other hand in Britain 52-73 Spotted crane were recorded at their high priority sites (Gilbert 2002). Worldwide it is purely resident to Turkey and Iran but this bird spends its winter in India and South Africa. For breeding it prefers Europe and Russia (Hoyo *et. al.*, 1996). Present population strength of waterfowl in above sites indicates the areas are able to give ecological guardian to the wetland associated Rallidae members.

According to Salim Ali (1996) Spotted crane have reported uncommon winter visitor in Maharashtra and Karnataka. The worldwide distribution of this species is poorly known. Most of the species in family Rallidae fairly common resident in Deccan plateau (Prasad 2003). It is resident of Spain and its surrounds. In Africa it spends the winter. In Indian subcontinent it extended up to Gujarat, Kashmir and Pakistan. But it breeds in western Asia. The bird is resident of Southern region of globe comprising Africa, Madagascar, Australia and New Zealand. But it spreads its winter in Indian subcontinent while they breed in central Asia, Europe and some part of Russia (Hoyo *et al.*, 1996). More importantly, in Hipparga bird count were decreased while in other remained sites gradually rises as wintering concern.

Brown crane is not common in Poona and Deccan it is Common except Poona (Betham 1904). Worldwide it is resident to India and Eastern china. It is resident to Indian subcontinent, Indonesia and Philippines but breeds from foot hills of Himalaya up to Myanmar and China. Water rail is resident of European region but breeds in Asia, Russia, northern subcontinent of India and China. It was spotted among the mangroves at Thane (Punjabi 1997). According to UK's national bird survey the population of spotted crane had declined by 65% since 1993 (Anonymous 2013). Further recommendations to these studies would be the few chapters of wintering ecology and conservation biology of Rallidae in Deccan Plateau.

Conclusion

Present all study sites in sub regions are very supportive. Floral connotations of the studied habitat sites could be main feature to tie this diverse family. Rallidae is also one of them a good representative and well distributed family in and around Solapur. It indicates the presence of wet grassland pockets in and around Solapur. Family Rallidae has stronger social status in their communal existence. It increasing the functioning of environment, gradually, the beauty of this land also. The habitat composition in all sites has a significant role in providing nourishment to keep upgraded the status of Crakes, Ralls and Coots in Solapur.

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