AN ANALYSIS OF THE COMPARATIVE BIODIVERSITY OF THE STATE OF HARYANA'S AVIFAUNAL DIVERSITY IN MAJOR WETLAND AREAS, NATIONAL PARKS, AND SANCTUARIES

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Abstract
Birds are the one of the lovely entities at this planet; they display an excellent range of unique capabilities allowing them to occupy extensive range of domain, Arctic to Antarctic and from barren region of Arab east to top of the mountains of the Andes. Besides, those warm-blooded feathered bipeds have constantly involved and attracted humans with their naturally attractive feather, melodic songs, and creative conduct in their herbal habitats. Apart from, birds play roles in pollination, act as scavengers, predators, and bio-indicators of environment and additionally they feature as early alarming system.
A lot of research and work has been carried out on numerous factors of avian variety in distinct areas of our country including the state of Haryana. However, very less data is available on avi-faunal diversity of reserved regions of Haryana especially on the time whilst lot of infrastructure improvement is being carried out withwithin the location.
Keywords:Birds, National parks, Sanctuaries.

1. INTRODUCTION

Birds are one of thegraceful and beautiful creatures of animals because of their amazingcolors, melodious calls, smoothpopularity and liveliness (Wenny et al., 2011; Brusatte et al., 2015). Birds play a crucialposition in preserving the stability of global ecosystems with the aid of usingsupplyingnumerous ecological offeringsalong with pollination, dispersal of seeds, eating of pests, scavenging and nutrient recycling etc. (Wenny et al., 2011). The ecological roles which birds play and the surroundingsofferingssuppliedwith the aid of using them are vital for the fitness of the ecosystems in addition to for human well-being (Whelan et al., 2015).

Reserved areas birds are one of the most important contents of the wildlife and research and study of these entities is one of the critical aspects to know about the overall well- being of the ecosystem (Arya et al., 2014). Availability of the diverse temperature and climatic conditions in India supports various types of wildlife lives and reserved areas. This results in providing residential and breeding support to the diverse population of birds either to its resident species, local migrants, summer and winter migrants or rare species (Srinla and Sobha, 2017). These reserved areas are few of the sites which are of international significance for the conservation of birds as well as other biodiversity (BirdLife International, 2014). In our country, five hundred and fifty-four sites have been recognized as the crucial reserved sites for the avi-faunal diversity regions (Rahmani et al., 2016).

India, have twenty-nine states and seven union territories are there. These all states have variable climatic weather which nurture diverse flora and fauna. Haryana is small state of India, where major agriculture is major occupation. Besides, this state have forested area of about 33138.12 hectares. This protected area has two

national parks, eight wildlife sanctuaries and two conservational reserves.

With the ever-rising human interferences and activities in the reserved areas the present study was carried out in the two regions i.e., Kalesar National Park and Bhindawas Bird Sanctuary. It was found that the number of species notified from both of the research filed areas is one hundred ninety-five and one hundred and thirty-five avian species respectively. Prior to this study, two hundred and two avian species from Bhindawas bird sanctuary, Khaparwas bird sanctuary, Chhilchhila bird sanctuary and Sultanpur national park were reported by Gupta and Bajaj (2002).

1.1. Avifaunal diversity at the research areas:

1.1.1. Kalesar National Park:

In the present research regular trips and survey were conducted and at Kalesar national park, bird diversity was noted down and it was noted to be one hundred and ninety-five reported from different areas/habitats. All the reported birds from the KNP were found to be belonged to sixteen order and fifty-nine families and one hundred thirty genera of birds. The largest order was found to be Passeriformes with ninety-eight avifaunal species belonging to thirty-three families.They belong to fifteen order and forty-five families. From his research it was concluded that Passeriformes was the largest order with maximum of bird species were noted (sixty-three) followed by the Ciconiiformes with thirty-nine avifaunal species. One study, on Chaprala wildlife sanctuary by Chavhan and Dhamani (2014) showed that seventy -six bird species from total thirty-nine families and the largest family was found to be Accipitridae. In the present study also, the largest family was coming out to be the Accipitridae.

From the available data it was found that the largest family in the order *Passeriformes* was *Muscicapidae*. This family was recorded to have fourteen bird species. This family was followed by families *Motacillidae* and *Cisticolidae*. From both these families total of eight bird species were recorded. Similarly, Koli (2014) recorded one hundred and forty-two avifaunal species comprises of eighteen order and forty-five families. This data was recorded from Todgarh-Raoli wildlife sanctuary, Rajasthan, India. From the available data it was found that families i.e., *Columbiformes*, *Piciformes* and *Cuculiformes* stand on equal position having seven avifaunal diversities in each group. Order *Columbiformes* and *Cuculiformes* were reported to have only one family i.e., *columbidae* and *cuculidae* respectively, whereas, *Capitonidae* and *Picidae* were recorded to have two families in order *Piciformes*. Likewise, order *Galliformes* and *Psittaciformes* were reported to have four species each and all these species belongs to single family *Phasianidae* and *Psittacidae* in order *Galliformes* and *Psittaciformes* respectively.

In a study by Dubey et al. (2015) carried out at Gorumara and Jaldapara National Parks, it was found that total of 128 bird species were recorded which belongs to total of forty-nine families. It was concluded that family *Columbidae* and *Picidae* were recorded to have seven bird species followed by family *Ardeidae* and *Dicruridae* with six bird species each. Family *Alcedinidae* were represented by five bird species. Similarly, family *Psittacidae*, *Cuculidae* and *Phasianidae* were recorded by four bird species each.

A similar study was carried out by Joshi and Rautela (2014), in Doon valley forest of Dehradun. They recorded one hundred and eighteen bird species which belonged to forty-one bird families. Das and Aditya (2016) recorded forty-five bird families that are members of the to twelve orders and twenty-five families in and around Sarojini Naidu college campus Kolkata West Bengal, India. In year 2016, Diljeet Singh recorded a total of fifty-four bird families that are members of the to eleven orders and twenty-four families around campus of Punjabi University Patiala. Kumar and Gupta (2009) on wetland birds around Kurukshetra found that family Anatidae was the largest family with eleven species. Chopra et al. (2012) observed a total of one hundred thirteen species of bird species in Sultanpur national park Gurgaon.

1.2. Residential Status of The Avifaunal Diversity at the KNP:

Total one ninety-five bird species were recorded during the research time frame and out these one hundred and thirty-nine were found to

be the local residents i.e., that place is their home ground while total of fifty avifaunal species were considered as the winter migrants and it was found that only 06 avifaunal species were summer migrants.In one of the studies by Kalsi (1998) It was found that majority of the bird species were found to be the winter travelers except a few likes of; *Clamatorjacobinus* and Asian Paradise Flycatcher, *Terpsiphoneparadisi*. These were recorded to be as the winter migrants. In the present studies the result shows the same trend i.e., presence of the more winter migratory birds in comparison to the summer migratory birds. Few birds like Pied Cuckoo, *Clamatorjacobinus* was observed only in summer season but Asian Paradise Flycatcher, *Terpsiphone paradise* was observed throughout whole year. Similarly, studies by Chopra et al, (2012) recorded one hundred and thirteen bird species from Sultanpur national park and out the one hundred and thirteen sixty-four were found to be the residents and forty-nine were categorized as migrants. In a similar study by Gupta et al., (2012) at Khaparwas Bird Sanctuary, recorded one hundred and sixty-four avifaunal diversities. From their study it was found that one hundred and four were the residents while forty-five birds' species were winter migrants, followed by nine bird species were local migrants and only five were found to be the summer migrants.

1.3. Bhindawas Bird Sanctuary:

In the prevailing study, majority of thebird species have been reported from the order Passeriformes. Supremacy of Passerines has additionally been in advancementionedby many researchers from the reserved sites of state of Haryana and elsewhere (Yadav and Maleywar, 1978; Sugathan, 1982; Aravind et al., 2001; Gupta and Bajaj, 2002; Gupta and Kaushik, 2011; Pawar, 2011; Chopra and Sharma, 2012; Gupta et al., 2012 c; Gupta and Kaushik, 2012; Rahalkar and Tiwari, 2012; Chopra et al., 2013; Ramachandra, 2013; Harney, 2014 b; Kuruvilla, 2014 a; Kanaujia et al., 2014; Chavan et al., 2015 and Sharma, 2016). Beresford et al. (2005) defined the feasible motive for this type ofexcessiverange of Passerine birds because of their capacityto make use ofdiversesorts of habitats and feed upon massiveformoffood items, i.e., fruits, floral buds, seeds, grains, nectar or even on small insects and invertebrates.

In the existing work, order Passeriformes became the major order by comprising fourteen families, namely, Alaudidae, Hirundinidae, Motacillidae, Pycnonotidae, Laniidae, Muscicapidae, Nectariniidae, Zosteropidae, Emberizidae, Passeridae, Sturnidae, Oriolidae, Dicruridae and Corvidae. Earlier, Gupta and Bajaj (2002) reported,seven bird species i.e., Indian Bush-Lark, Ashy-topped Sparrow-Lark, Black-topped Sparrow Lark, Rufous-tailed Lark, Sand Lark, Crested Lark and Oriental Sky Lark. Similarly, Chopra and Sharma (2014) suggestedfive species, namely, Indian Bush Lark, Sand Lark, Common Crested Lark, Singing Bush Lark and Rufous Tailed Lark in Shivalik ranges foothills. In the present-day work, family Hirundinidae of order Passeriformes comprises of Sand Martin, Plain Martin, Common Swallow, Red-rumpedSwallow, Streak-throated Swallow and Wire-tailed Swallow. Similarly, Chopra et al. (2013) have additionallysuggested Red-rumped Swallow and Plain Martin in Sultanpur national park. Kumar and Gupta (2009) recorded three species of one family, i.e., Plain Martin, Common Swallow and Wire-Tailed Swallow in Kurukshetra; Kumra and Gupta (2013) foundthree species (Plain Martin, Common Swallow and Wire-Tailed Swallow) in Chhilchhilawildlife sanctuary; Chopra and Sharma (2014) suggestedfive species, i.e., Wire-tailed Swallow, House Swallow, Striated Swallow, Streak-throated Swallow and Red Rumped Swallow from one family from the Shivalik foothills. However, different researchers had additionallymentioned Sand Martin in northern Indian region (Green, 1986 and Vyas, 1996).

Chopra and Sharma (2014) foundfive species (White Wagtail, Forest Wagtail, Yellow Wagtail, White Browed Wagtail and Grey Wagtail) from Shivalik region. From the present research work it was found that,family Pycnonotidae belonging to order Passeriformes comprises of Red-vented Bulbul and White-eared Bulbul.

1.4. Residential Status of The Avifaunal Diversity at the BNP:

In the present study an effort was made to study the residential status of the avifaunal diversity at the Bhindawas Bird Sanctuary. In that the data collected and it was found that total of eighty-seven bird species were enlisted as "Resident", forty-two bird species as "Winter Migrant" and only six bird species as "Summer Migrant". Gupta and Bajaj (2002) recorded one hundred and ninety-two birds‟ species belonging to seventeen orders and forty-eight families from Bhindawas bird sanctuary, Jhajjar, Haryana. Out of these, one hundred and eleven bird species have been local residents' resident, 60 species have been iciness migratory, sixteen species have been nearby migratory, five species have been summer time season migrant and one bird species turned into straggler. Gupta and Kaushik (2011) determined forty-seven avifaunal species of wetland birds in Hathnikund Barrage in Haryana. Of the total, twenty-six avifaunal species have been iciness migratory, thirteen resident and nine species have been nearby migratory. Chopra and Sharma (2012) pronounced eighty-eight avifaunal species belonging to thirty-two families and seventeen orders. Out of these, sixty-seven have been local residents, eight have been iciness migrants and thirteen have been nearby migrants. In the prevailing study, Lesser Whistling-Duck, Cotton Teal, Pheasant-tailed Jacana, Bronze-winged Jacana, Asian Koel and Blue-tailed Bee-eater have been categorized as "Summer Migrant". Earlier, Kumar and Gupta (2009) determined fifty-four species of birds in Kurukshetra. Of the total, twenty-nine bird species had been local resident and twenty-five bird species had been migrants. Mostly migratory species had been wintry weather site visitors whilst, two species, i.e., Lesser Whistling-Duck and Cotton Teal had been summer time season site visitors. Singh and Laura (2012) additionally recorded Black-crowned Night Heron, Blue tailed Bee-eater and Asian Koel as summer time season migratory and White Wagtail and Long-billed Pipit as wintry weather migratory from Tilyar Lake, Rohtak. Gupta and Kaushik (2013 a) determined fifty-eight avifaunal species belonging to ten orders and eighteen families in Nigdu-Sarovar. Of total, twenty-nine avifaunal species had been wintry weather migrants, seventeen avifaunal species had been local residents, nine species had been neighbourhood migratory and three avifaunal species like Lesser-whistling Duck, Pheasant-tailed Jacana, and Blue-cheeked Bee-eater had been summer time season migrant.

Likewise, Gupta et al. (2011) determined one hundred fifty-two avifaunal species of birds in Chhilchhila bird sanctuary. Of them, ninety species have been resident, forty-three species have been wintry weather migratory, thirteen species have been neighborhood migratory and seven species have been summer time season migratory. The birds like Greylag Goose, Bar-headed Goose, Mallard, Gadwall, Northern Shoveller, Northern Pintail, Garganey, Common Teal, Common Pochard, Tufted Pochard, Common Coot, Little Ringed Plover, Kentish Plover, Spotted Redshank, Common Redshank, Marsh Sandpiper, Wood Sandpiper and Pied Avocet have been reported all through the iciness season. It is vital to say right here that birds, namely, Lesser-whistling Duck, Comb Duck, Pheasant-tailed Jacana, and Eurasian Golden Oriole have been reported withinside the summer time in Chhilchhila bird sanctuary. During the research period, birds like Greylag Goose, Northern Shoveller, Northern Pintail, and Common Coot have been visible in huge number. However, birds like Black-necked Stork and Mallard have been visible in very much less quantity and constantly pronounced in pairs. Gupta and Kaushik (2011) additionally determined the same findings in Hathnikund Barrage.

1.5. Variations of avifaunal diversity:

Because of climatic changes in the research area there will be notable variations in the bird population and diversity. This seasonal variation is noted according to the season i.e., Monsoon (mid-June to mid-September), Post-Monsoon (mid-September to mid-November), winter (mid-November to late-February) and summer season (March to mid-June). After the survey and visits data collected showed one hundred and forty-six during the winter season. While the least number i.e., twenty-eight avi-faunal diversity were recorded in post-monsoon. Bhat et. Al., also reported the same data. It was concluded that maximum number of avifaunal diversity war reported and recorded in winter season. This was supported by the fact that

there is availability of ample food, optimum availability of water, increased vegetation and the arrival of migratory birds. And the least number of avifaunal diversities is supported by the fact that post monsoon there is least availability of food, heavy rain results in increased flow of water and return of migratory birds.

1.6. Major threats factors affecting the biodiversity at the research sites alongwith the conservation strategies:

The human activities had beendeterminedone of themost important threats withinside the reserved areas. Unfortunately, anthropogenic activities especially usage of dry wood by nearbyresidents is found to be one of the major disturbing activities which destroys the natural vegetation of the reserved areas. Moreover, the lack of feed for animals and fuel-timber are found to be the few of the most important reason which encouraged the nearby residents to go in the reserved areas. People acquire and preservethosefuel-timberwithinsidethewintry weather months and use these dry-wood withinside themonsoon season.

Birds are at extrarisk of habitat destruction and wooded area destruction. So, any sort ofventureswithin and close to the boundary of these reserved areas could directly put adverse effect on to their survival and thoseventuresmust be limited. Since few years these areas are open to tourist and because ofmoves of automobilewithinthe forests and peripheral regionscanbeaccountable for decline of migratory birds at these reserved spots. It is likewisefound out that these reserved spots are gaining recognition as for avi-fauna watching areas. Hundreds of nature lovers, watchers and researchers come to go to these sites through-out the year.

During research period it was found that lot of threats to the natural existence of avi-faunal diversity like of, it changed into located that some of strain factors which include noise pollution because of nearby vehicles, dumping of garbage, and waste from sewage, slicing down of forest surrounding the water bodies, encroachment for making homes and washing of cloths on the bank of lake have an direct effect on the avian population and diversity at the research areas.

On the basis of detailed research in the reserved areas, it is recommended for the future that:

- These sites should be protected by the Government
- The authorities have to acquire the private land and all of the developmental pursuits have to be prohibited withinside the reserved areas.
- There is an instantaneous requirement of organization of bird watching camps with the assistance of expert bird watchers and nearby people. It will increase the hobby and economy of nearby people.
- The road being built near the reserved regions have to be diverted to keep away from the habitat fragmentation of those areas.
- Persistent water sources have to be made available to solve the water shortage issue.
- The use of non-conventional sources of energy like sun panels and warmers and LPG (Liquefied Petroleum Gas) have to be promoted to lower the weight of fuel wood on those reserved sites.
- Long-time period tracking of the biodiversity of the reserved regions have to be executed on regular basis for the improvement of a sustainable management plan and conservation strategies.
- At timely intervals, sensitization programmes and camps have to be launched for the area people to recognize the significance of biodiversity for mankind.
- Inhabitants of the region have to be engaged in diverse conservation and anti-poaching programmes.
- Mass contact programmes in addition to distribution of literature in local language, putting in sign boards at diverse locations via audio-visible documentaries have to be promoted withinside the close by villages to teach the local community about the importance of natural world withinside the reserved area. Some Indian establishments like WII and ZSI can play essential function on this direction.
- The boom of invasive weeds together with water hyacinth withinside the reserved regions have to be checked regularly.

- The farmers have to be recommended to undertake natural farming practices withinside the adjoining agricultural region to lessen the use of insecticides and fertilizers
- Government managements and departments have to take good enough steps for control of home and sewage discharge in addition to the embankment of water sources in order to right nesting and breeding sites may be available to the birds.
- There must be a halt at the deforestation in and across the reserved areas.
- There must be prohibition at the dumping of debris and sewage disposal in the reserved areas.

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