AVIFAUNAL COMPOSITION OF VARIOUS MICROHABITATS OF SOUTHERN NAGAUR (PARBATSAR, KUCHAMAN, NAWA AND MAKRANA), RAJASTHAN

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ABSTRACT

Present study comprises a comprehensive dataset about the Avifaunal diversity of one of the climatic transition zone i.e., Southern Nagur, Rajasthan. The Study was conducted under the classified six different microhabitats i.e., Agricultural Field Plains, Sambhar Lake and Other Waterbodies, Aravalli Hill Patches, Urban Settlements, Scrub Thorn Forest and Open Grasslands & Wastelands. The key aspect of present study is to provide well structured and extensive information on the avian diversity, their distribution and their habitat association at the study area. A total of 191 Avifaunal species belonging to 21 Orders and 61 Families were recorded from study area. A total of 7 Feeding Guilds were observed in the study area viz., Carnivores, Frugivores, Granivores, Herbivores, Insectivores, Nectivores and Omnivores. The Migratory status and IUCN status of the observed species was also assessed. Jaccard and Sorenson index's was highest for the Agricultural and Grassland Microhabitats.

1. INTRODUCTION

The state of Rajasthan can be divided into two major climatic zones i.e. Arid and Semi-arid, by the Aravalli Mountain ranges. The districts lying near Aravalli mountain ranges act as a transition zone between such two climatic zones. With variety of microhabitats in the state of Rajasthan along with two Ramsar Sites i.e., are Keoladeo National Park and Sambhar Lake (Islam and Rahmani, 2004). Rajasthan is rich in various floral and faunal components including the avifaunal diversity with estimation of about 500 species of birds (BNHS, 2011b).

Birds are one of the best indicators of environmental quality, health and they easily depicted significant variations against changes in the microhabitat quality in both the terms spatial as well as temporal. Birds also exhibit the relationship with the structure and characteristics of the microhabitat (Cody, 1978). The population and
community structure of bird is directly affected by the food availability, nest site availability, human exposure and presence of other threat (Wiens, 1989). Studying the bird population is useful to monitor the long term changes in habitat quality and responses of birds to both natural and anthropogenic induced environmental changes (Wiens, 1989).

As, this is well known fact, that the transition zones exhibited greater amount of diversity as they shared nearly all characteristics of both the nearby microhabitats. Inspite of such importance still many transition zones including the Nagaur district are not evaluated properly for their faunal diversity including the avifaunal compositions. The present study is an approach to fulfill such gap as it comprises the avifaunal diversity of southern region of Nagaur district in classified six different microhabitats i.e., Agricultural Field Plains, Sambhar Lake and Other Waterbodies, Aravalli Hill Patches, Urban Settlements, Scrub Thorn Forest and Open Grasslands & Wastelands. The main purpose of this study is to provide well structured and extensive information on the avian diversity, distribution and habitat association of avifauna of southern region of Nagaur, administratively comes under the Parbatsar, Nawa, Makrana and Kuchaman towns of Nagaur District.

1.1. OBJECTIVES OF THE STUDY

The objective of present study is to prepare an avifaunal inventory of the study area by observing all six microhabitats and to identify the feeding guild (Simberloff and Dayan 1991), IUCN Status (IUCN, 2020) and Migration Pattern (Able, 1995) of the documented bird species of the study area.

2. MATERIALS AND METHODS

2.1. PROFILE OF STUDY AREA

The study was carried out in six microhabitats at southern region of Nagaur district, Rajasthan. The study area located between 26°54'20.1"N 74°46'31.5"E at transition zone between arid and semiarid climatic zones of Rajasthan.

Four seasons are recognized at the study area based on rainfall i.e., Summer (April-June), Pre-monsoon (July-September), Monsoon (October-December) and Post-monsoon (January-March). The December to January is the coolest time period and May to June is the warmest period at the study area. The study area is well dominated by Agricultural Lands followed by Scrub Thorn Forest and Wasteland. The western parts of the study area are covered by Aravalli Mountain Ranges. Soils are relatively fertile and support all agricultural activity in the study area. Four types of soils have been reported from the study area viz., Clay, Clay Loam, Sandy Loam and Sandy Soil. The area lies under the transition zone of arid and semiarid climate and is represented by chiefly Dry mixed deciduous thorn forest along with some bushy plants Anogeissus pendula and Capparis decidua. The plainer parts of the study area is dominated by Acacia nilotica, Acacia senegal, Salvadora persica etc. The nearby of seasonal rivers and streams the soil is of sandy with good amount of moisture and mainly populated by the Dalbergia sissoo as the common tree, while other important species are Azadirachta indica, Prosopis cineraria and Prosopis juliflora. The degraded areas at the catchment are dominated by an invasive plant Prosopis juliflora. Due to high saline condition the other species does not survive easily at the study area but the growth of Prosopis juliflora is in abundance.

Agro-Ecosystems or Agricultural area covers the largest portion of study area. The area is mostly cultivated during the monsoon season. Some of the important crops like Pearl millet, Cluster bean, Sesame, Green gram, Moth bean are the main seasonal crops. However, in more fertile soil groundnut, wheat, cumin, cotton, mustard and gram are also grown on fairly large scale.
2.2. DATA COLLECTION

Regular field surveys were carried out from August 2019 to August 2020 resulting in a total 52 surveys in six microhabitats: 20 in summer, 20 in winter and 12 in monsoon. The length of transect remained constant in all the surveys that is 1000 m (1KM). The time remained constant in all microhabitat, morning surveys was carried out from 6:00 Am to 9:00 Am and evening surveys was carried out from 4:00 Pm to 7:00 Pm. Olympus Binocular 10*50X was used for on field observations and Canon- Eos 1300D camera was used for photography. For identification of birds “Book of Indian Birds” by Salim ali (Ali, 1992) and “A field guide on the birds of the Indian subcontinent” Grimmett (Grimmett et al., 1998) was referred. Checklist was prepared using various methods like Adhoc, Area Search Method, Point Count Method, Rolling Bird Survey Method and Call Based Identification Method (Urfi et al., 2005).

2.3. DATA ANALYSIS

Relative Diversity Index (RDi)

The relative diversity (RDi) of families was calculated (Torre-Cuadros et al., 2007).

\[
RDi = \frac{\text{Number of bird species in a family}}{\text{Total number of bird species}} \times 100
\]

Sorensen Index

To assess the association of species between two study sites, Sorensen’s index of similarity (Sorensen, 1948) was calculated.

\[
C_s = \frac{2j}{(a + b)}
\]

Where j = number of species common to both sites; a = number of species at site A; b = number of species at site B

Jaccard Index

To assess the association of species between two study sites, Jaccard index of similarity was calculated.

\[
C_j = \frac{j}{(a + b - j)}
\]
3. RESULTS AND DISCUSSION

A total of 191 Avifaunal species were recorded from study area (Table 1). Total 21 Orders were recorded from the study area (Table 2). Order Passeriformes dominated the study area with 71 Bird species followed by order Charadriiformes (28), Anseriformes (14), Pelecaniformes (13) and Accipitriformes (12). A total of 61 Families were recorded from study area (Table 3). Family Anatidae dominated the study area with 14 species followed by Muscicapidae (12), Accipitridae (11) and Scolopacide (11) with relative diversity value of 7.33%, 6.28%, 5.76% and 5.76% respectively. A total of 7 Feeding Guilds were observed in the study area viz., Carnivores, Frugivores, Granivores, Herbivores, Insectivores, Nectivores and Omnivored based on the food preferences of the Avifauna (Table 4 & Fig. 2).

Most Birds in study area preferred Insectivore feeding guild as of 77 species of total 191 are insectivore followed by Carnivores (45), Granivores (24), Omnivores (23), Herbivores (11), Frugivores (10) and only one species of Nectivores. 119 out of total 191 species recorded in study area were identified as residential species of the area, 72 species were identified as Migratory species out of which 5 as Summer Migratory and 67 as Winter Migratory (Table 5 & Fig. 3).

In recorded 191 species, a total of 4 IUCN Red List Categories out of 7 was observed in the study area. 178 Species out of 191 were identified as Least Concerned Species. 8 Species were identified as Near Threatened species which are Ferruginous pochard, Great thick knee, River tern, Black tailed godwit, Painted Stork, Oriental White Ibis, Lesser Flamingo, Alexendrine Parakeet. 3 Species i.e. Common Pochard, Woolly Necked Stork, Southern Grey Shrike were identified as Vulnerable, And 2 Species viz., Egyptian Vulture and Steppe Eagle as Endangered (Table 6 & Fig. 4).

During the entire period of study the maximum species was observed from the Water bodies microhabitat (95 species) followed by Scrub forest microhabitats (89). In contrast the minimum species represented by Urban settlements microhabitat (38 species). The higher amount of species diversity indicated the better quality and resource availability at that particular microhabitat.

Jaccard and Sorenson index's increasing values indicates the similarity between two microhabitats. The Agricultural and Grassland Microhabitats have highest values (Jaccard= 0.559, Sorenson= 0.717) are much similar to each other.

| S. N O | Order     | Family   | Common name     | Scientific name       | Feeding Guild | Migratory Status | IUCN Status   |
|--------|------------|----------|-----------------|-----------------------|--------------|------------------|--------------|
| 1      | Accipitriformes | Accipitridae | Black winged kite | Elanus axillaris      | Carnivorous  | R                | Least concern |
| 2      | Accipitriformes | Accipitridae | Black kite       | Milvus migrans       | Carnivorous  | R                | Least concern |
| 3      | Accipitriformes | Accipitridae | Shikra           | Accipiter badius     | Carnivorous  | R                | Least concern |
| 4      | Accipitriformes | Accipitridae | Oriental honey buzzard | Pernis ptilorhynchos | Carnivorous  | R                | Least concern |
| 5      | Accipitriformes | Accipitridae | White eyed buzzard | Butastur teesa       | Carnivorous  | R                | Least concern |
| 6      | Accipitriformes | Accipitridae | Eurasian Marsh harrier | Ciircus aeruginosus | Carnivorous  | W                | Least concern |
| 7      | Accipitriformes | Accipitridae | Egyptian vulture | Neophron percnopterus | Carnivorous  | R                | Endangered   |
| No. | Order                  | Family      | Common Name                  | Scientific Name       | Diet     | IUCN Status         |
|-----|------------------------|-------------|-------------------------------|-----------------------|----------|---------------------|
| 8   | Accipitriformes        | Accipitridae| Montagu's harrier             | Circus pygargus       | Carnivorous | W Least concern   |
| 9   | Accipitriformes        | Accipitridae| Long leg buzzard              | Buteo rufinus         | Carnivorous | W Least concern   |
| 10  | Accipitriformes        | Accipitridae| Steppe eagle                  | Aquila nipalensis     | Carnivorous | W Endangered      |
| 11  | Accipitriformes        | Accipitridae| Common buzzard                | Buteo buteo           | Carnivorous | W Least concern   |
| 12  | Accipitriformes        | Pandionidae | Osprey                        | Pandion haliaetus     | Carnivorous | R Least concern   |
| 13  | Anseriformes           | Anatidae    | Bar headed goose              | Anser indicus         | Omnivorous | R Least concern   |
| 14  | Anseriformes           | Anatidae    | Ruddy Shelduck                | Tadorana ferruginea   | Omnivorous | W Least concern   |
| 15  | Anseriformes           | Anatidae    | Common pochard                | Aythya ferina         | Omnivorous | W Vulnerable      |
| 16  | Anseriformes           | Anatidae    | Ferrogenous pochard           | Aythya nyroca         | Omnivorous | W Near Threatened |
| 17  | Anseriformes           | Anatidae    | Graylag goose                 | Anser anser           | Herbivorous | W Least concern   |
| 18  | Anseriformes           | Anatidae    | Knob billed duck              | Sarkidiornis melanotos| Herbivorous | R Least concern   |
| 19  | Anseriformes           | Anatidae    | Lesser whistling duck         | Dendrocygna javanica  | Herbivorous | R Least concern   |
| 20  | Anseriformes           | Anatidae    | Northern Pintail              | Anas acuta            | Herbivorous | W Least concern   |
| 21  | Anseriformes           | Anatidae    | Common teal                   | Anas crecca           | Herbivorous | W Least concern   |
| 22  | Anseriformes           | Anatidae    | Spot billed duck              | Anas poecilorhyncha   | Herbivorous | R Least concern   |
| 23  | Anseriformes           | Anatidae    | Mallard                       | Anas platyrhynchos    | Herbivorous | W Least concern   |
| 24  | Anseriformes           | Anatidae    | Gadwall                       | Anas strepera         | Herbivorous | W Least concern   |
| 25  | Anseriformes           | Anatidae    | Garganey                      | Anas querquedula     | Herbivorous | W Least concern   |
| 26  | Anseriformes           | Anatidae    | Northern shoveler             | Anas clypeata         | Carnivorous | W Least concern   |
| 27  | Apodiformes            | Apodidae    | House swift                   | Apus affinis          | Insectivorous | R Least concern   |
| 28  | Bucerotiformes         | Upupidae    | Common hoopoe                 | Upupa epops           | Insectivorous | R Least concern   |
| 29  | Bucerotiformes         | Bucerotidae | Indian grey hornbill          | Ocyceros birostris    | Frugivorous | R Least concern   |
| 30  | Charadriiformes        | Burhinidae  | Great thick knee              | Esacus recurvirostris | Carnivorous | W Near threatened |
| 31  | Charadriiformes        | Burhinidae  | Indian thick knee             | Burhinus oedicnemus   | Insectivorous | R Least concern   |
| 32  | Charadriiformes        | Charadriidae| Kentish Plover                | Charadrius alexandrinus| Insectivorous | W Least concern   |
| No. | Order          | Family         | Species                          | Diet            | Status      | IUCN   |
|-----|----------------|----------------|----------------------------------|-----------------|-------------|--------|
| 33  | Charadriiformes| Charadriidae   | Little Ringed Plover             | Insectivorous   | R           | Least concern |
| 34  | Charadriiformes| Charadriidae   | Red wattled lapwing              | Insectivorous   | R           | Least concern |
| 35  | Charadriiformes| Charadriidae   | Yellow wattled lapwing           | Insectivorous   | R           | Least concern |
| 36  | Charadriiformes| Glareolidae    | Small pratincole                 | Insectivorous   | W           | Least concern |
| 37  | Charadriiformes| Laridae        | Black headed gull                | Omnivorous      | W           | Least concern |
| 38  | Charadriiformes| Laridae        | Brown Headed Gull                | Omnivorous      | W           | Least concern |
| 39  | Charadriiformes| Laridae        | Gull billed tern                 | Carnivorous     | W           | Least concern |
| 40  | Charadriiformes| Laridae        | Pallas gull                      | Carnivorous     | W           | Least concern |
| 41  | Charadriiformes| Laridae        | River tern                       | Carnivorous     | W           | Near Threatened |
| 42  | Charadriiformes| Laridae        | Whiskered tern                   | Carnivorous     | W           | Least concern |
| 43  | Charadriiformes| Recurvirostridae| Black winged stilt              | Carnivorous     | R           | Least concern |
| 44  | Charadriiformes| Recurvirostridae| Pied avocet                     | Insectivorous   | W           | Least concern |
| 45  | Charadriiformes| Rostratulidae  | Greater painted snipe           | Omnivorous      | R           | Least concern |
| 46  | Charadriiformes| Scolopacidae   | Black tailed godwit              | Insectivorous   | W           | Near Threatened |
| 47  | Charadriiformes| Scolopacidae   | Common Sandpiper                 | Insectivorous   | W           | Least concern |
| 48  | Charadriiformes| Scolopacidae   | Little stint                     | Insectivorous   | W           | Least concern |
| 49  | Charadriiformes| Scolopacidae   | Ruff                            | Herbivorous     | W           | Least concern |
| 50  | Charadriiformes| Scolopacidae   | Common snipe                    | Insectivorous   | W           | Least concern |
| 51  | Charadriiformes| Scolopacidae   | Spotted redshank                 | Insectivorous   | W           | Least concern |
| 52  | Charadriiformes| Scolopacidae   | Common redshank                  | Insectivorous   | W           | Least concern |
| 53  | Charadriiformes| Scolopacidae   | Green sandpiper                  | Insectivorous   | W           | Least concern |
| 54  | Charadriiformes| Scolopacidae   | Wood sandpiper                   | Insectivorous   | W           | Least concern |
| 55  | Charadriiformes| Scolopacidae   | Temminck's stint                 | Insectivorous   | W           | Least concern |
| 56  | Charadriiformes| Scolopacidae   | Curlew sandpiper                 | Insectivorous   | W           | Least concern |
| Page | Order          | Family         | Common Name                        | Scientific Name          | Diet      | Status               |
|------|----------------|----------------|------------------------------------|--------------------------|-----------|----------------------|
| 57   | Charadriiformes| Turnicidae     | Barred button quail                | *Turnix suscitator*      | Granivorous | R Least concern     |
| 58   | Ciconiformes   | Ciconiidae     | Asian openbill                     | *Anastomus oscitans*     | Carnivorous | R Least concern     |
| 59   | Ciconiformes   | Ciconiidae     | Painted stork                      | *Mycteria leucocephala*  | Carnivorous | R Near Threatened   |
| 60   | Ciconiformes   | Ciconiidae     | Woolly necked stork                | *Ciconia episcopus*      | Carnivorous | R Vulnerable        |
| 61   | Columbiformes  | Columbidae     | Blue rock dove                     | *Columbia livia*          | Carnivorous | R Least concern     |
| 62   | Columbiformes  | Columbidae     | Laughing Dove                      | *Spilopelia senegalensis*| Carnivorous | R Least concern     |
| 63   | Columbiformes  | Columbidae     | Spotted dove                       | *Spilopelia chinensis*   | Carnivorous | R Least concern     |
| 64   | Columbiformes  | Columbidae     | Red-collared dove                  | *Streptopelia tranquebarica*| Carnivorous | R Least concern     |
| 65   | Columbiformes  | Columbidae     | Eurasian collared dove             | *Streptopelia decaocto*  | Carnivorous | R Least concern     |
| 66   | Columbiformes  | Columbidae     | Yellow footed green pigeon         | *Treron phoenicoptera*   | Frugivorous | R Least concern     |
| 67   | Coraciiformes  | Alcedinidae    | Common kingfisher                  | *Alcedo atthis*           | Carnivorous | R Least concern     |
| 68   | Coraciiformes  | Alcedinidae    | Pied kingfisher                    | *Ceryle rudis*            | Carnivorous | R Least concern     |
| 69   | Coraciiformes  | Alcedinidae    | White throated kingfisher          | *Halcyon smyrnensis*     | Insectivorous | R Least concern     |
| 70   | Coraciiformes  | Coracidae      | European roller                    | *Coracias garrulus*      | Insectivorous | S Least concern     |
| 71   | Coraciiformes  | Coracidae      | Indian roller                      | *Coracias benghalensis*  | Insectivorous | R Least concern     |
| 72   | Coraciiformes  | Meropidae      | Green bee-eater                    | *Merops orientalis*       | Insectivorous | R Least concern     |
| 73   | Coraciiformes  | Meropidae      | Blue tailed bee-eater              | *Merops philippinus*     | Insectivorous | W Least concern     |
| 74   | Coraciiformes  | Meropidae      | Blue cheeked bee-eater             | *Merops persicus*         | Insectivorous | W Least concern     |
| 75   | Cuculiformes   | Cuculidae      | Jacobin cuckoo                     | *Clamator jacobinus*     | Insectivorous | S Least concern     |
| 76   | Cuculiformes   | Cuculidae      | Common hawk cuckoo                 | *Hierococcyx varius*     | Insectivorous | R Least concern     |
| 77   | Cuculiformes   | Cuculidae      | Asian koel                         | *Eudynamys scolopaceus*  | Frugivorous | R Least concern     |
| 78   | Cuculiformes   | Cuculidae      | Greater coucal                     | *Centropus sinensis*     | Carnivorous | R Least concern     |
| 79   | Falconiformes  | Falconidae     | Common kestrel                     | *Falco tinnunculus*      | Carnivorous | R Least concern     |
| 80   | Galliformes    | Phasianidae    | Grey Francolin                      | *Francolinus pondicerianus*| Carnivorous | R Least concern     |
| 81   | Galliformes    | Phasianidae    | Common quail                       | * Coturnix coturnix*     | Carnivorous | S Least concern     |
| No. | Order          | Family       | Spece                                  | Size     | Diet             | Status         |
|-----|----------------|--------------|----------------------------------------|----------|------------------|----------------|
| 82  | Galliformes    | Phasianidae  | Rain quail                             | Galliformes | Granivorous      | R              | Least concern |
| 83  | Galliformes    | Phasianidae  | Indian peafowl                         | Galliformes | Omnivorous       | R              | Least concern |
| 84  | Galliformes    | Phasianidae  | Rock bush quail                        | Galliformes | Herbivorous      | R              | Least concern |
| 85  | Gruiformes     | Gruidae      | Common crane                           | Gruiformes | Omnivorous       | W              | Least concern |
| 86  | Gruiformes     | Gruidae      | Demoiselle crane                       | Gruiformes | Omnivorous       | W              | Least concern |
| 87  | Gruiformes     | Rallidae     | White breasted water hen               | Gruiformes | Insectivorous    | W              | Least concern |
| 88  | Gruiformes     | Rallidae     | Grey headed swamp hen                  | Gruiformes | Omnivorous       | R              | Least concern |
| 89  | Gruiformes     | Rallidae     | Common moorhen                         | Gruiformes | Omnivorous       | R              | Least concern |
| 90  | Gruiformes     | Rallidae     | Common coot                            | Gruiformes | Omnivorous       | R              | Least concern |
| 91  | Passeriformes  | Alaudidae    | Indian bushlark                        | Passeriformes | Omnivorous       | R              | Least concern |
| 92  | Passeriformes  | Alaudidae    | Crested lark                           | Passeriformes | Omnivorous       | R              | Least concern |
| 93  | Passeriformes  | Alaudidae    | Rufous tailed lark                     | Passeriformes | Omnivorous       | R              | Least concern |
| 94  | Passeriformes  | Alaudidae    | Singing bushlark                       | Passeriformes | Omnivorous       | R              | Least concern |
| 95  | Passeriformes  | Alaudidae    | Greater short toed lark                | Passeriformes | Omnivorous       | W              | Least concern |
| 96  | Passeriformes  | Alaudidae    | Ashy crowned sparrow lark              | Passeriformes | Omnivorous       | R              | Least concern |
| 97  | Passeriformes  | Campephagidae| Small minivet                          | Passeriformes | Insectivorous    | R              | Least concern |
| 98  | Passeriformes  | Campephagidae| Large cuckoo shrike                    | Passeriformes | Insectivorous    | W              | Least concern |
| 99  | Passeriformes  | Certhiidae   | Indian spotted creeper                 | Passeriformes | Insectivorous    | R              | Least concern |
| 100 | Passeriformes  | Cisticolidae | Rufous fronted prinia                  | Passeriformes | Insectivorous    | R              | Least concern |
| 101 | Passeriformes  | Cisticolidae | Plain prinia                           | Passeriformes | Insectivorous    | R              | Least concern |
| 102 | Passeriformes  | Cisticolidae | Ashy prinia                            | Passeriformes | Insectivorous    | R              | Least concern |
| 103 | Passeriformes  | Cisticolidae | Grey breasted prinia                   | Passeriformes | Insectivorous    | R              | Least concern |
| 104 | Passeriformes  | Cisticolidae | Jungle prinia                          | Passeriformes | Insectivorous    | R              | Least concern |
| 105 | Passeriformes  | Cisticolidae | Common tailorbird                      | Passeriformes | Insectivorous    | R              | Least concern |
| 106 | Passeriformes  | Corvidae     | Rufous treepie                         | Passeriformes | Omnivorous       | R              | Least concern |
| No. | Order       | Family      | Species                        | Diet          | Status       |
|-----|-------------|-------------|--------------------------------|---------------|--------------|
| 10  | Passeriformes | Corvidae    | House crow                     | Omnivorous    | R Least concern |
| 10  | Passeriformes | Dicruridae  | Black drongo                   | Insectivorous | R Least concern |
| 10  | Passeriformes | Dicruridae  | White bellied drongo           | Insectivorous | R Least concern |
| 11  | Passeriformes | Emberizidae | Crested bunting                | Granivorous   | R Least concern |
| 11  | Passeriformes | Emberizidae | Red headed bunting             | Granivorous   | W Least concern |
| 11  | Passeriformes | Estrildidae | Indian silverbill              | Granivorous   | R Least concern |
| 11  | Passeriformes | Hirundinidae| Streak throated swallow        | Insectivorous | R Least concern |
| 11  | Passeriformes | Hirundinidae| Wire tailed swallow            | Insectivorous | R Least concern |
| 11  | Passeriformes | Hirundinidae| Red Rumped Swallow             | Insectivorous | R Least concern |
| 11  | Passeriformes | Laniidae    | Bay backed shrike              | Insectivorous | R Least concern |
| 11  | Passeriformes | Laniidae    | Long tailed shrike             | Insectivorous | R Least concern |
| 11  | Passeriformes | Laniidae    | Southern grey shrike           | Insectivorous | R Vulnerable  |
| 12  | Passeriformes | Leiothrichidae | Common babbler               | Granivorous   | R Least concern |
| 12  | Passeriformes | Leiothrichidae | Large grey babbler           | Granivorous   | R Least concern |
| 12  | Passeriformes | Leiothrichidae | Jungle babbler                | Granivorous   | R Least concern |
| 12  | Passeriformes | Motacillidae | White wagtail                  | Insectivorous | W Least concern |
| 12  | Passeriformes | Motacillidae | White browed wagtail           | Insectivorous | R Least concern |
| 12  | Passeriformes | Motacillidae | Citrine wagtail                | Insectivorous | W Least concern |
| 12  | Passeriformes | Motacillidae | Yellow wagtail                 | Insectivorous | W Least concern |
| 12  | Passeriformes | Motacillidae | Paddyfield pipet              | Insectivorous | R Least concern |
| 12  | Passeriformes | Muscicapidae | Red-breasted flycatcher        | Insectivorous | W Least concern |
| 12  | Passeriformes | Muscicapidae | Bluethroat                     | Insectivorous | W Least concern |
| 13  | Passeriformes | Muscicapidae | Oriental magpie robin          | Insectivorous | R Least concern |
| 13  | Passeriformes | Muscicapidae | Indian robin                   | Insectivorous | R Least concern |
| # | Order              | Family         | Species Name                          | Order                          | Status    | Conservation Status |
|---|--------------------|----------------|---------------------------------------|--------------------------------|-----------|---------------------|
| 13 | Passeriformes      | Muscicapidae   | Black redstart                        | Passeriformes                  | W         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Common Stonechat                      | Passeriformes                  | R         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Desert wheatear                       | Passeriformes                  | W         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Isabelline wheatear                   | Passeriformes                  | W         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Variable wheatear                     | Passeriformes                  | W         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Pied bushchat                         | Passeriformes                  | W         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Brown rockchat                        | Passeriformes                  | R         | Least concern       |
| 13 | Passeriformes      | Muscicapidae   | Blue rockthrush                       | Passeriformes                  | W         | Least concern       |
| 14 | Passeriformes      | Nectariniidae  | Purple sunbird                        | Nectariniidae                  | R         | Least concern       |
| 14 | Passeriformes      | Oriolidae      | Indian oriole                         | Oriolidae                      | S         | Least concern       |
| 14 | Passeriformes      | Paridae        | Great tit                             | Paridae                        | R         | Least concern       |
| 14 | Passeriformes      | Passeridae     | Chestnut Shouldered petronia          | Passeridae                     | R         | Least concern       |
| 14 | Passeriformes      | Passeridae     | House sparrow                         | Passeridae                     | R         | Least concern       |
| 14 | Passeriformes      | Phylloscopidae | Common chiffchaff                     | Phylloscopidae                 | W         | Least concern       |
| 14 | Passeriformes      | Phylloscopidae | Sulphur- bellied warbler              | Phylloscopidae                 | W         | Least concern       |
| 14 | Passeriformes      | Ploceidae      | Baya weaver                           | Ploceidae                      | R         | Least concern       |
| 14 | Passeriformes      | Pycnonotidae   | White eared bulbul                    | Pycnonotidae                   | R         | Least concern       |
| 14 | Passeriformes      | Pycnonotidae   | Red vented bulbul                     | Pycnonotidae                   | R         | Least concern       |
| 15 | Passeriformes      | Rhipiduridae   | White browed fantail                  | Rhipiduridae                   | R         | Least concern       |
| 15 | Passeriformes      | Stenostiridae  | Grey headed cannery flycatcher        | Stenostiridae                  | W         | Least concern       |
| 15 | Passeriformes      | Sturnidae      | Brahminy starling                     | Sturnidae                      | R         | Least concern       |
| 15 | Passeriformes      | Sturnidae      | Asian pied starling                   | Sturnidae                      | R         | Least concern       |
| 15 | Passeriformes      | Sturnidae      | Common starling                       | Sturnidae                      | W         | Least concern       |
| 15 | Passeriformes      | Sturnidae      | Rosy starling                         | Sturnidae                      | W         | Least concern       |
| 15 | Passeriformes      | Sturnidae      | Common myna                           | Sturnidae                      | R         | Least concern       |
| 15    | Order         | Family   | Scientific Name                      | Diet               | Status          |
|-------|---------------|----------|-------------------------------------|--------------------|-----------------|
| 7     | Passeriformes | Sturnidae| Bank myna                           | Omnivorous         | Least concern   |
| 8     | Passeriformes | Sylviidae| Lesser white throat                  | Insectivorous      | Least concern   |
| 9     | Passeriformes | Sylviidae| Yellow Eyed Babbler                 | Insectivorous      | Least concern   |
| 10    | Passeriformes | Vangidae | Common woodshrike                    | Insectivorous      | Least concern   |
| 11    | Passeriformes | Zosteropidae | Oriental white eye | Omnivorous | Least concern   |
| 12    | Pelecaniformes | Ardeidae | Cattle egret                         | Carnivorous        | Least concern   |
| 13    | Pelecaniformes | Ardeidae | Intermediate egret                  | Carnivorous        | Least concern   |
| 14    | Pelecaniformes | Ardeidae | Great egret                          | Carnivorous        | Least concern   |
| 15    | Pelecaniformes | Ardeidae | Indian pond heron                    | Carnivorous        | Least concern   |
| 16    | Pelecaniformes | Ardeidae | Purple Heron                         | Carnivorous        | Least concern   |
| 17    | Pelecaniformes | Ardeidae | Grey Heron                           | Carnivorous        | Least concern   |
| 18    | Pelecaniformes | Ardeidae | Little Green Heron                   | Carnivorous        | Least concern   |
| 19    | Pelecaniformes | Threskiornithidae | Black ibis                   | Carnivorous        | Least concern   |
| 20    | Pelecaniformes | Threskiornithidae | Glossy ibis              | Carnivorous        | Least concern   |
| 21    | Pelecaniformes | Threskiornithidae | Oriental white ibis             | Carnivorous        | Least concern   |
| 22    | Pelecaniformes | Threskiornithidae | Eurasian Spoonbill       | Carnivorous        | Least concern   |
| 23    | Phoenicopteriformes | Phoenicopteridae | Lesser flamingo  | Omnivorous         | Near Threatened |
| 24    | Phoenicopteriformes | Phoenicopteridae | Greater flamingo      | Omnivorous         | Least concern   |
| 25    | Piciformes    | Megalaimidae | Coppersmith barbet         | Frugivorous        | Least concern   |
| 26    | Piciformes    | Picidae   | Eurasian wryneck                   | Insectivorous      | Least concern   |
| 27    | Piciformes    | Picidae   | Yellow crowned woodpecker          | Frugivorous        | Least concern   |
| 28    | Piciformes    | Picidae   | Black rumped flambac              | Insectivorous      | Least concern   |
| 29    | Podicipediformes | Podicipedidae | Little grebe                  | Carnivorous        | Least concern   |
Avifaunal Composition of Various Microhabitats of Southern Nagaur (Parbatsar, Kuchaman, Nawa and Makrana), Rajasthan

| No. | Order            | Suborder       | Genus                  | Species                  | Diet     | Status       |
|-----|------------------|----------------|------------------------|--------------------------|----------|--------------|
| 18 2| Psittaciformes   | Psittacidae    | Psittacula             | krameri                  | Frugivorous | R            | Least concern |
| 18 3| Psittaciformes   | Psittacidae    | Psittacula             | cyanocephala             | Frugivorous | R            | Least concern |
| 18 4| Psittaciformes   | Psittacidae    | Psittacula             | eupatria                 | Frugivorous | R            | Near Threatened |
| 18 5| Pterocliformes   | Pteroclidae    | Pterocles              | exustus                  | Granivorous | R            | Least concern |
| 18 6| Strigiformes     | Strigidae      | Bubo                   | bengalensis              | Carnivorous | W            | Least concern |
| 18 7| Strigiformes     | Strigidae      | Athene                 | brama                    | Carnivorous | R            | Least concern |
| 18 8| Strigiformes     | Tytonidae      | Tyto                   | alba                     | Carnivorous | R            | Least concern |
| 18 9| Suliformes       | Phalacrocoraxia| Phalacrocorax          | carbo                    | Carnivorous | W            | Least concern |
| 19 0| Suliformes       | Phalacrocoraxia| Phalacrocorax          | fuscicollis              | Carnivorous | W            | Least concern |
| 19 1| Suliformes       | Phalacrocoraxia| Phalacrocorax          | niger                    | Carnivorous | R            | Least concern |

Table 2: Order wise Occurrence of observed species

| S. No. | Order            | No. of Species |
|--------|------------------|----------------|
| 1      | Accipitriformes  | 12             |
| 2      | Anseriformes     | 14             |
| 3      | Apodiformes      | 1              |
| 4      | Bucerotiformes   | 2              |
| 5      | Charadriiformes  | 28             |
| 6      | Ciconiiformes    | 3              |
| 7      | Columbiformes    | 6              |
| 8      | Coraciiformes    | 8              |
| 9      | Cuculiformes     | 4              |
| 10     | Falconiformes    | 1              |
| 11     | Galliformes      | 5              |
| 12     | Gruiformes       | 6              |
| 13     | Passeriformes    | 71             |
| 14     | Pelecaniformes   | 13             |
| 15     | Phoenicopteriformes | 2           |
| 16     | Piciformes       | 4              |
| 17     | Podicipediformes | 1              |
| 18     | Psittaciformes   | 3              |
| 19     | Pterocliformes   | 1              |
| 20     | Strigiformes     | 3              |
| 21     | Suliformes       | 3              |
Table 3: Family wise Occurrence of observed species along with their RDi

| S. No. | Family          | No. of Species | RDi%  |
|--------|----------------|----------------|-------|
| 1      | Accipitridae    | 11             | 5.76  |
| 2      | Pandionidae     | 1              | 0.52  |
| 3      | Anatidae        | 14             | 7.33  |
| 4      | Apodidae        | 1              | 0.52  |
| 5      | Upupidae        | 1              | 0.52  |
| 6      | Bucerotidae     | 1              | 0.52  |
| 7      | Burhinidae      | 2              | 1.05  |
| 8      | Charadriidae    | 4              | 2.09  |
| 9      | Glareolidae     | 1              | 0.52  |
| 10     | Laridae         | 6              | 3.14  |
| 11     | Recurvirostrida | 2              | 1.05  |
| 12     | Rostratulidae   | 1              | 0.52  |
| 13     | Scolopacidae    | 11             | 5.76  |
| 14     | Turnicidae      | 1              | 0.52  |
| 15     | Ciconiidae      | 3              | 1.57  |
| 16     | Columbidae      | 6              | 3.14  |
| 17     | Alcedinidae     | 3              | 1.57  |
| 18     | Coraciidae      | 2              | 1.05  |
| 19     | Meropidae       | 3              | 1.57  |
| 20     | Cuculidae       | 4              | 2.09  |
| 21     | Falconidae      | 1              | 0.52  |
| 22     | Phasianidae     | 5              | 2.62  |
| 23     | Gruidae         | 2              | 1.05  |
| 24     | Rallidae        | 4              | 2.09  |
| 25     | Alaudidae       | 6              | 3.14  |
| 26     | Campephagidae   | 2              | 1.05  |
| 27     | Certhiidae      | 1              | 0.52  |
| 28     | Cisticolidae    | 6              | 3.14  |
| 29     | Corvidae        | 2              | 1.05  |
| 30     | Dicriuridae     | 2              | 1.05  |
| 31     | Emberizidae     | 2              | 1.05  |
| 32     | Estrildidae     | 1              | 0.52  |
| 33     | Hirundinidae    | 4              | 2.09  |
| 34     | Laniidae        | 3              | 1.57  |
| 35     | Leiothrichidae  | 3              | 1.57  |
| 36     | Motacillidae    | 5              | 2.62  |
| 37     | Muscicapidae    | 12             | 6.28  |
| 38     | Nectariniidae   | 1              | 0.52  |
| 39     | Oriolidae       | 1              | 0.52  |
| 40     | Paridae         | 1              | 0.52  |
| 41     | Passeridae      | 2              | 1.05  |
| 42     | Phylloscopidae  | 2              | 1.05  |
| 43     | Ploceidae       | 1              | 0.52  |
| 44     | Pycnonotidae    | 2              | 1.05  |
| 45     | Rhipiduridae    | 1              | 0.52  |
| 46     | Stenostiridae   | 1              | 0.52  |
| 47     | Sturnidae       | 6              | 3.14  |
| 48     | Sylviiidae      | 2              | 1.05  |
| 49     | Vangidae        | 1              | 0.52  |
Avifaunal Composition of Various Microhabitats of Southern Nagaur (Parbatsar, Kuchaman, Nawa and Makrana), Rajasthan

|    | Feeding Guild             | No. of Species | Percentage |
|----|--------------------------|----------------|------------|
| 1  | Carnivorous              | 45             | 23.5%      |
| 2  | Frugivorous              | 10             | 5.2%       |
| 3  | Granivorous              | 24             | 12.5%      |
| 4  | Herbivorous              | 11             | 5.7%       |
| 5  | Insectivorous            | 77             | 40.3%      |
| 6  | Nectivorous              | 1              | 0.5%       |
| 7  | Omnivorous               | 23             | 12%        |

Figure 2: Observed Species in Different Classified Microhabitats

Table 4: Feeding Guild and their Percentage in Overall Population of Observed Species at Study Area
Figure 3: Feeding Guild of species in study area

Table 5: Migratory Status of Observed Species at Study Area

| S. No. | Migratory Status | No. of Species |
|--------|------------------|----------------|
| 1      | Residential      | 119            |
| 2      | Summer Migratory | 5              |
| 3      | Winter Migratory | 67             |

Figure 4: Migratory status of species in study area
Avifaunal Composition of Various Microhabitats of Southern Nagaur (Parbatsar, Kuchaman, Nawa and Makrana), Rajasthan

Table 6: IUCN Status of Observed Species at Study Area

| S. No. | IUCN Status   | No. of Species |
|-------|---------------|----------------|
| 1     | Endangered    | 2              |
| 2     | Least concern  | 178            |
| 3     | Near Threatened| 8              |
| 4     | Vulnerable    | 3              |

Figure 5: IUCN status of species in study area

4. CONCLUSIONS AND RECOMMENDATIONS

A total of 191 Avifaunal species belonging to 21 Orders and 61 Families were recorded from study area. The dominance among families was exhibited by family Anatidae (14 species with 7.33%, RDi) followed by Muscicapidae (12 species with 6.28% RDi), Accipitridae (11 species with 5.76% RDi) and Scolopacidae (11 species with 5.76% RDi) respectively. Seven Feeding Guilds were identified during the study i.e., Insectivore (77 species) followed by Carnivores (45 species), Granivores (24 species), Omnivores (23 species), Herbivores (11 species), Frugivores (10 species) and Nectivores (1 species) based on the food preferences of the Avifauna. Out of 191 species recorded 72 species were Migratory (5 Summer Migratory & 67 Winter Migratory).

178 Species listed as Least Concern Species, 8 Species listed as Near Threatened species, 3 Species listed as Vulnerable and 2 Species were listed as Endangered under the IUCN Categories.

Most of birds inhabiting these areas are vulnerable to habitat degradation due to flaws in existing legal frameworks. In addition, community knowledge enhancements also should be strengthened for a sustainable conservation of bird species while maintaining their ecological interactions. Meanwhile Nagaur district act as a transition zone between Arid and Semi-arid habitats of Rajasthan but unfortunately still does not have any Important Bird & Biodiversity Area (IBA), it is strongly recommended to propose an Important Bird & Biodiversity Area (IBA). Simultaneously, further long-term studies are recommended that covering migratory seasons for the bird species along with and documentation and population assessment of other components of biodiversity that ultimately enhance the knowledge about the diversity and its importance to the people at the study area.

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CONFLICT OF INTEREST

The author have declared that no competing interests exist.

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