

Birdlife And Plant Diversity Of Jhalana Leopard Safari Park, Jaipur: Insights On Distribution And Conservation

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Abstract:

A research was done to assess the avian biodiversity along the Jhalana Forest roadside, in close proximity to the Jagatpura Flyover in Jaipur. The study was conducted for duration of one year, spanning from January, 2023 to February, 2024. The intensity and frequency of human-animal conflicts has escalated in recent decades due to the exponential increase in the human population over the past century and the subsequent encroachment of human activities on wilderness areas. Jhalana Forest Reserve (JFR) presents the characteristics of island biogeography in the heart of Jaipur, which is a city of 3.1 million people. The comprehensive checklist of birds given here consists of 218 species recorded from the Sanctuary belonging to 72 families. Out of which 13 species are common resident, 6 are not common passage migrant, 48 not common resident, 7 not common summer visitor, 30 not common winter visitor, 1 common passage migrant, 7 common winter visitor, 1 locally common passage migrant, 82 locally common resident, 4 locally common summer visitor, 17 locally common winter visitor and 2 vagrant species. 29 Family show the lowest representation with only one species each. Family Accipitridae shows the highest number of representatives of 16 species in the area. Species like, Indian Pitta (*Pitta brachyura*) migrate to the area only during their breeding season, i.e. in monsoon. The list consists of 9 species listed in the IUCN threatened list, and 4 endemics. Jhalana covers an expanse of 20 square km. The Rajasthan Forest Department officially designated Jhalana as a Leopard Reserve in 2017. Jhalana was inaugurated for public visitation in December 2016. The Jhalana forest harbors a wide variety of trees, which may play a crucial role in the proliferation of bird species.

Keywords: Jhalana Leopard Safari, Flora, Avian Diversity, Birds and Leopard Reserve.

Introduction:

Jhalana Leopard Safari, India's first leopard reserve, was established in 2017 in Jaipur, Rajasthan. It is nestled within the Aravalli hills and covers an area of approximately 17-20 square kilometers. This unique reserve boasts diverse topography, featuring rocky hills, evergreen and deciduous forests, valleys, plateaus, sand dunes, and more. Despite being an isolated forest fragment in an urban environment, Jhalana supports a rich variety of plant, animal, and bird species that have adapted to the pressures of rapid urbanization and population growth. The climate of the area is characterized by high temperatures, ranging from 18°C in winter to 40°C in summer, with an average annual rainfall of 600 mm, primarily during the monsoon period from June to September.

The Jhalana Leopard Safari Park is home to around 30-35 leopards, with 6-7 of them residing in the park's tourism area, making it a popular destination for spotting these elusive big cats. Alongside the leopards, the park is also a haven for over 218 bird species, including raptors like shikras and white-eyed buzzards, showcasing the natural biodiversity of the region. Ecologists often use bird populations as indicators to understand species diversity and the impact of habitat loss on bird communities. Habitat changes, such as alterations in vegetation composition, affect the availability and quality of resources like food, water, and cover for birds, ultimately influencing their diversity, abundance, and distribution.

This study aims to explore bird diversity in the Jhalana Forest, specifically near the Jagatpura Flyover in Jaipur. With no prior research conducted on bird diversity in this specific location, this study will provide valuable baseline data. The research will assess variations in bird communities among different sites within the forest. A recent study by the American Museum of Natural History estimates that there are around 18,000 bird species worldwide, highlighting the importance of understanding and conserving avian diversity. Nature conservation and wildlife protection are integral parts of Rajasthan's culture, reflected in the prevalent faith and traditions of its society. This study will contribute to the ongoing efforts to preserve the rich biodiversity of the Jhalana Leopard Safari Park and its surroundings.

Materials and Methods:

Site Selection:

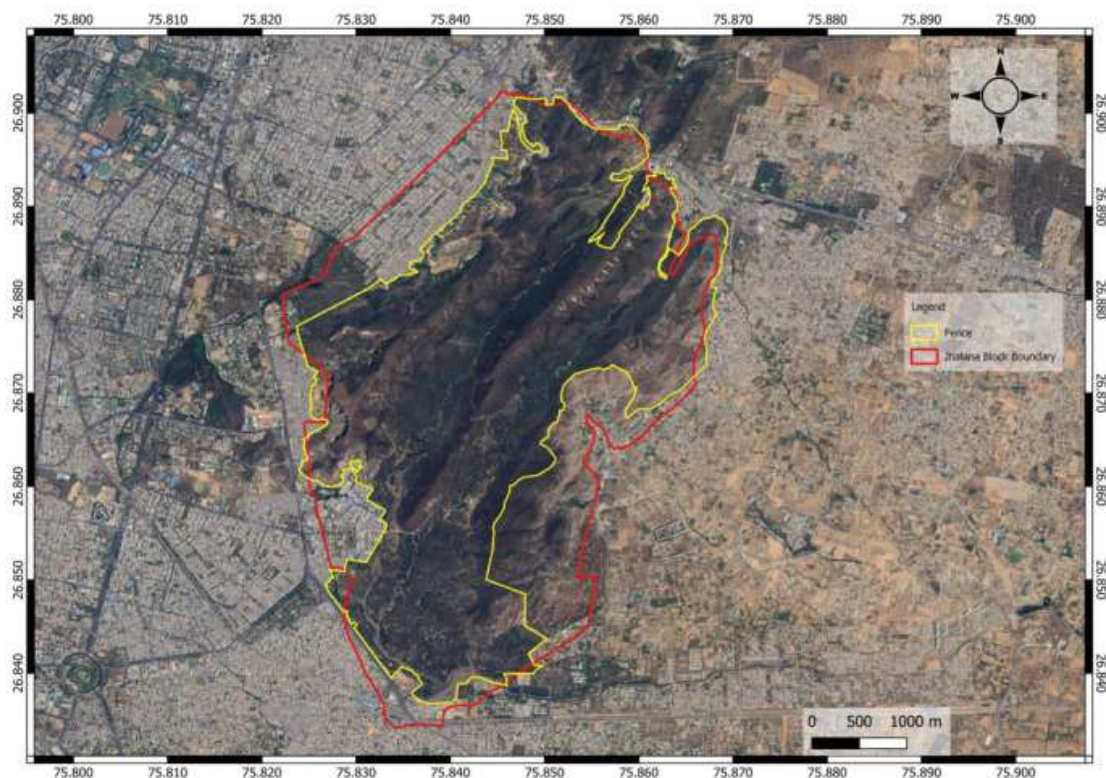
A study was conducted within the confines of the Jhalana Forest roadside, near the Jagatpura Flyover in Jaipur. The Jhalana Forest roadside, near the Jagatpura Flyover in Jaipur is known to be inhospitable for birds. The Jhalana forest is located in the foothills of the Aravalli range, just outside the industrial district of Jaipur city. It covers an area of 17 square km. The region exhibits a varied geography, featuring the rugged Aravalli range on one side and a lush forest of both evergreen and deciduous trees on the other, which forms its perimeter. Jhalana exhibits a wide range of geographical features, including hills, valleys, plateaus, sand dunes, nallahs, and gullies. The study region is located at a latitude of 26° 55' North and a longitude of 75° 49' East. Geographically, it falls within the semi-arid zone of India. The region is characterised by a high temperature, low rainfall, and mild winter. The average temperature ranges from 18°C in winter (January) to 40°C in summer (June), with a mean temperature of 36°C. The normal rainfall is 600 mm, with almost 90% occurring during the summer monsoon period from June to September. The remaining rainfall comes from winter cyclones. The area is a designated forest reserve that serves as the habitat for several species of untamed flora, approximately 20 leopards, and over 218 species of birds, including predatory birds such as shikras and white-eyed buzzards. This showcases the rich diversity of the natural world and its riches.

Instruments Used:

The instrument used was the Olympus 8×40 DPS Binoculars. Binoculars are a pair of telescopes that are positioned next to each other and adjusted to face the same direction. The most crucial factor is comfort. The device must possess ergonomic design for ease of handling. All binoculars possess a pair of two digits that indicate their specifications, sometimes preceded by a letter code such as B or GA. The initial figures denote the magnification, typically ranging from 7X to 10X. For general bird watching, smaller magnification binoculars with a power of 7X or 8X are typically employed. As the magnification decreases, the image becomes brighter and the field of view becomes wider.

Avifauna Survey Methodology:

Bird census and monitoring is an extremely cost-effective way of monitoring the overall health of the ecosystem. Bird species were recorded by observations made through Olympus 8×40 DPS Binoculars with the help of the identification books of Ali and Ripley (3). Observations were made by both transect and direct visual count method. Counts were carried out from half an hour after sunrise to 11:00 and from 15:00 to half an hour prior to sunset.



(Figure: The location of the Jhalana Reserve Forest in Rajasthan State, northwestern India. The red line marks the official boundaries of the Jhalana Reserve Forest, and the yellow line marks the fence around the forest areas.)

Biodiversity of Jhalana Leopard Safari Park:

This area very rich Biodiversity with references to flora and fauna both Provide habitats for various migratory and resident birds. More than 218 species of belonging to 51 families were recorded. The birds commonly sighted included some endangered, uncommon, vulnerable, threatened and near threatened species.

Type of Forest with Major Species:

Jhalana is a dry deciduous forest and the trees mostly shed their leaves in dry season and get green during monsoons. The forest is scattered over a large area on various geological and soil formations, and vary greatly in composition and quality. Edaphic and biotic factors determine their distribution. The main species of the tree which cover over 80 percent of the area is Dhok (*Anogeissus pendula*). Its associates like Salar (*Boswellia serrata*), and Gurjan (*Linnea coromendelica*) grow on rocks and dry areas. Khair (*Acacia catechu*) is common in park and Bamboo (*Dendrocalamus strictus*) grow in extremely limited extent along with well drained reaches of the stream sand moist, cooler aspects of the hill where soil for- formation still exists. It is also found in park. The trees are generally slow growing and attain poor height. The height of trees varies from 4.5 meters to 7.5 metres. In favourable localities the height up to 12 metres is attained. Imli (*Tamarindus indica*), Aam (*Mangifera indica*), Jamun (*Syzygium cumini*), Tendu (*Diospyros melanoxylon*), Bahera (*Terminalia bellirica*), Arjun (*Terminalia arjuna*), Churel (*Holoptelia integrifolia*), Siris (*Albizia lebbek*), Ficus spp. etc. which grow in moist localities attain large size, both in crown spread and height. Where valleys fan out in open and where they flatten and become wide, Dhak (*Butea monosprema*) grows gregariously. These forests have been classified on the basis of their composition as follows:

- (i) Dhok forest
- (ii) Salar forest
- (iii) Khair forest
- (iv) Miscellaneous forest - Further divided into four types
 - (a) Dhak forest
 - (b) Forest along nallas
 - (c) Scrub forest
 - (d) Bamboo forest.

Composition and condition of the Crop:

Distribution of each type under following heads:

(I) Dhok (*Anogeissus pendula*) Forest:

This is the Principal species growing in the area. This corresponds to 5/0-1, *Anogeissus pendula* Forest type which is an edaphic climax in tropical dry deciduous forest (7). The Dhok is a gregarious tree species and is often found in pure stands in the middle slopes of the hills where it may form over 80% of the crop. Dhok leaves are good fodder. They are browsed while on the trees as well as when dried and fallen on ground. Process of turning of leaves to rusty red to brown and finally grey starts from November. By March the trees become leafless leaving sufficient leaf-forage on the ground. The common associates of Dhok are Khair, Tendu, Khirni (*Wrightia tinctoria*), Gurjan (*Linnea coromendelica*), Dhak, Churel and Ber (*Zizyphus mauritiana*) are found at the foot of the hills, in park and along nallahs. Tree species like Jamun (*Syzygium cumini*) Kalam (*Mitragyna Parvifolia*), Gular (*Ficus glomerata*), Rohini (*Mallotus philippinensis*) are found in moist localities.

(II) Salar (*Boswellia serrata*) Forest:

Next to Dhok, Salar is the principal tree Spp. of these forests. This type corresponds to 5/E-2; "Boswellia forest" which is an edaphic climax is Group 5, "Tropical Dry deciduous Forest"(7). It is found on hill tops and is mixed with Dhok upto middle of the slopes. The common associates are Gurjan, Karaya (*Sterculia urens*), Tendu (*Diospyros melenoxylon*), Dhaman (*Grewia latifolia*), Khair and Safed Dhok. The forests add to the beauty of the landscape when their leaves start turning' into rusty and pale yellow appearances in September before fall.

(III) Khair (*Acacia catechu*) Forests:

Khair is an important associate of Dhok and Salar and occurs scattered on tops and hill slops. They serve as good brows and their pods are good food for birds and ungulates.

(IV) Miscellaneous Forests:

These are found along nallahs, rivers and tanks which are more or less perennial. The vegetation corresponds to 'Type 1 S/I Dry Tropical Riverian Forest (7). The Common species found are Gular (*Ficus glumerata*), Chila, Jamun, Kalam, Khajur (*Phoenix sylvestris*), Rohni. They produce fruits rich in sugar contents.

(C) Other Miscellaneous Forest:

Miscellaneous forests of inferior nature correspond to E/8, Saline/Alkaline Scrub Savannah consisting of Jal (*Capparis sepiaria*), Hingot (*Balanites aegyptica*), Kair (*Capparis decidua*), Bel (*Aegle marmelose*), Ghatbor (*Zizyphus xylopara*); and Jhariber (*Zizyphus nummularia*). Their fruits again are liked by animals especially in summer when forage is dry and many a times it is not available.

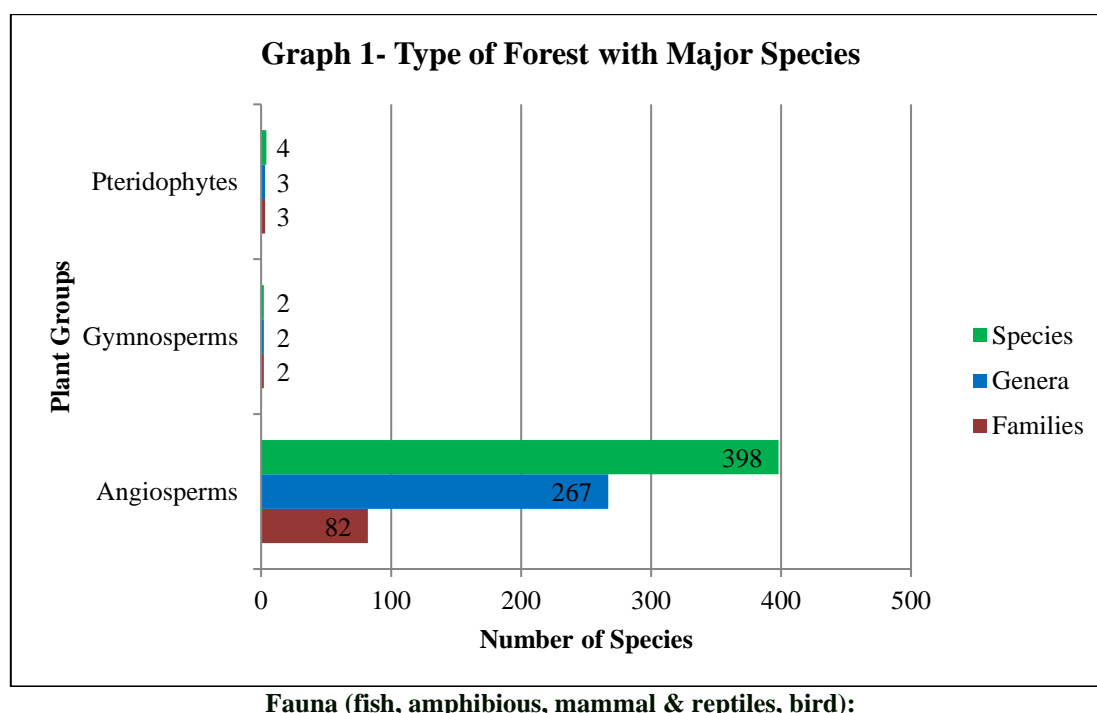
(D) Bamboo Forests:

Bamboo (*Dendrocalamus strictus*) occurs in the forests of this tract which is classified as 5/e-9, Dry Bamboo Brake by

Champion & Seth. Bamboo is found along nallahs in Dhok and Salar forests in Aravalli hills. Regeneration is not satisfactory. The bamboo leaves form forage of significance for animals of the sanctuary. A total number of 404 indigenous and naturalised plant spp. belonging to 272 genera under 87 families are met with in Jhalana Leopard Safari.

Table 1- Type of Forest with Major Species

Angiosperms	Families	Genera	Species
• Monocotyledons	13	59	90
• Dicotyledons	69	208	308
Total	82	267	398
Gymnosperms	2	2	2
Pteridophytes	3	3	4
Grand Total	87	272	404



Fauna (fish, amphibious, mammal & reptiles, bird):

The fauna comprises various species. They range from mammals and reptiles to colorful birds. The common animals here are Nilgai is commonly found in open plains and in the foothills of the Aravallis. Panther, Sambar, chital, rhesus macaque, langur, jackal, wolf, Indian porcupine, desert fox, Indian gerbil, five striped palm squirrel, desert gerbil, wild boar, jungle cat, desert cat and other wild animals. Like crocodiles are the monarchs of the aquatic life. Other reptiles include cobra, Indian chameleon and the garden lizard. Common mongoose and Indian mongoose are mostly found in this area. Thus the fauna of Jhalana Leopard Safari supports many kinds of animal species. More than 218 species of birds found at lake, another water bodies and surroundings Sanctuary area. The number of water fowls visiting this area, in winter season and so many other beautiful land birds also found in sanctuary area both domestic and migratory all over year.

Important sights:

Birds live in specific areas according to the climate and topographical surroundings. Although every area of park important bird habitat but Godiyana and Todaladi have more important.

Godiana: The main vegetations along the courses of park are planted acacia nilotica and Acacia tortilis along with Acacia senegal, whereas in the interior part is mixed type vegetation. Accordingly, the bird life along rivers and forest is also diverse, depending on the nature of the habitat. This is the reason why this area has more important for bird watching.

Todaladi: The main vegetations inside nallas are planted acacia nilotica and Acacia tortilis along with Acacia senegal and Munja. This area is very important for ground birds.

Status of Birds:

The status was classified as following after distributions (3, 4), however, the classification and nomenclature was followed.

- ❖ **Locally Common Resident (LCR)** - species, which are found in the Sanctuary area throughout the year in good numbers.
- ❖ **Not Common Resident (NCR)** - species, which are not found commonly in the Sanctuary area throughout the year.
- ❖ **Not Common Winter Visitor (NCWV)** -species, which are found uncommonly during winter.
- ❖ **Not Common Summer Visitor (NCSV)** - species, which are found uncommonly during summer.
- ❖ **Common Winter Visitor (CWV)** - species, which are found commonly during winter.
- ❖ **Locally Common Summer Visitor (LCR)** - species, which are not found commonly in the Sanctuary area in the summer.
- ❖ **Locally Common Winter Visitor (LCWV)** - species, which are found commonly during winter.
- ❖ **Common Resident (CR)** - May be seen daily, in suitable habitat and season, but not in large numbers.
- ❖ **Not Common Passage Migrant (NCPM)** - species, which are stops uncommonly somewhere for a short time during a seasonal migration.
- ❖ **Locally Common Passage Migrant (LCPM)** - species, which are sighted on the passage from their wintering grounds to the breeding grounds or vice versa.
- ❖ **Vagrant (V)** -species, which is not regularly sighted, nor winter migrant nor breeding migrant and hence supposed to be a stray bird sighting.

Residency Categories:

- ❖ **Breeder** - Population reproduces in the park.
- ❖ **Resident** - A significant population is maintained in the Sanctuary for more than two months each year, but it is not known to breed there.
- ❖ **Migratory** - Migratory species that occurs in park approximately two months or less each year and does not breed there.
- ❖ **Vagrant** - Sanctuary is outside of species' usual range.

Results:

The comprehensive checklist of birds given here consists of 218 species recorded from the Sanctuary belonging to 72 families. Out of which 13 species are common resident, 6 are not common passage migrant, 48 not common resident, 7 not common summer visitor, 30 not common winter visitor, 1 common passage migrant, 7 common winter visitor, 1 locally common passage migrant, 82 locally common resident, 4 locally common summer visitor, 17 locally common winter visitor and 2 vagrant species. 29 Family Alcedinidae, Anhingidae, Bucerotidae, Burhinidae, Caprimulgidae, Carduelinae, Centropodidae, Cerylidae, Dendrocygnidae, Falconidae, Glareolidae, Halcyonidae, Larini, Megalaiminae, Monarchidae, Nectariniinae, Pelecanidae, Pittidae, Podicipedidae, Rhipiduridae, Rostratulidae, Salpornithinae, Strigidae, Turdinae, Turnicidae, Tytonidae, Upupidae, Vangidae, Zosteropidae show the lowest representation with only one species each. Family Accipitridae shows the highest number of representatives of 16 species in the area. Species like, Indian Pitta (*Pitta brachyuran*) migrate to the area only during their breeding season, i.e. in monsoon. The list consists of 9 species listed in the IUCN threatened list, and 4 endemics.

Threatened Species:

Two species of vultures, namely, White-rumped Vulture *Gyps bengalensis* (Critically Endangered), Egyptian Vulture *Neophron percnopterus* (Endangered) reported from the Sanctuary. Alexandrine Parakeet (*Psittacula eupatria*), Black-headed Ibis (*Threskiornis melanocephalus*), Painted Stork (*Mycteria leucocephala*) & River Tern (*Sterna aurantia*) are 4 Near Threatened Species in the sanctuary. Two species, namely, Common Pochard (*Aythya ferina*) and White-naped Tit (*Machlolophus nuchalis*) are Vulnerable Species. Steppe Eagle (*Aquila nipalensis*) is a Endangered found in this area.

Endemic species: Following four species endemic to sanctuary has been found: Painted Spurfowl (*Galloperdix lunulata*), Rock Bush Quail (*Perdica argoondah*), Rufous-tailed Lark (*Ammomanes phoenicura*) and White-naped Tit (*Machlolophus nuchalis*).

Table2: Most frequently found birds

Species	Name	Status
FAMILY- Accipitrinae		
<i>Accipiter badius</i>	Shikra	Not Common Winter Visitor
<i>Accipiter gentilis</i>	Northern Goshawk	Not Common Winter Visitor
<i>Accipiter nisus</i>	Eurasian Sparrowhawk	Not Common Winter Visitor
<i>Aquila nipalensis</i>	Steppe Eagle	Not Common Resident

<i>Aquila rapax</i>	Tawny Eagle	Vagrant
<i>Buteo teesa</i>	White-eyed Buzzard	Vagrant
<i>Buteo rufinus</i>	Long-legged Buzzard	Not Common Winter Visitor
<i>Circus gallicus</i>	Short-toed Snake Eagle	Not Common Resident
<i>Elanus caeruleus</i>	Black-shouldered Kite	Locally Common Resident
<i>Gyps bengalensis</i>	White Backed Vulture	Not Common Resident
<i>Gyps fulvus</i>	Eurasian Griffon	Not Common Resident
<i>Haliastur indus</i>	Brahminy Kite	Not Common Resident
<i>Milvus migrans</i>	Black Kite	Locally Common Resident
<i>Neophron percnopterus</i>	Egyptian Vulture	Common Resident
<i>Pernis ptilorhynchus</i>	Oriental Honey- buzzard	Not Common Resident
<i>Spilornis cheela</i>	Crested Serpent Eagle	Not Common Resident
FAMILY- Acrocephalinae		
<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler	Locally Common Passage Migrant
<i>Orthotomus sutorius</i>	Common Tailorbird	Locally Common Resident
<i>Phylloscopus collybita</i>	Common Chiffchaff	Locally Common Winter Visitor
FAMILY- Aegithinidae		
<i>Aegithina nigrolutea</i>	Marshall's Iora	Not Common Resident
<i>Aegithina tiphia</i>	Common Iora	Locally Common Resident
FAMILY- Alaudidae		
<i>Ammomanes phoenicurus</i>	Rufous-tailed Lark	Common Resident
<i>Calandrella brachydactyla</i>	Greater Short-toed Lark	Common Winter Visitor
<i>Eremopterix grisea</i>	Ashy-crowned Sparrow Lark	Locally Common Resident
<i>Galerida cristata</i>	Crested Lark	Common Resident
<i>Mirafra erythroptera</i>	Indian Bushlark	Locally Common Resident
FAMILY- Alcedinidae		
<i>Alcedo atthis</i>	Common Kingfisher	Locally Common Resident
FAMILY- Anatini		
<i>Anas acuta</i>	Northern Pintail	Locally Common Winter Visitor
<i>Anas clypeata</i>	Northern Shoveler	Locally Common Winter Visitor
<i>Anas crecca</i>	Common Teal	Locally Common Winter Visitor
<i>Anas penelope</i>	Eurasian Wigeon	Locally Common Winter Visitor
<i>Anas platyrhynchos</i>	Mallard	Not Common Winter Visitor
<i>Anas poecilorhyncha</i>	Spot-billed Duck	Locally Common Resident
<i>Anas strepera</i>	Gadwall	Locally Common Winter Visitor
<i>Aythya ferina</i>	Common Pochard	Locally Common Winter Visitor
FAMILY- Anhingidae		
<i>Anhinga melanogaster</i>	Darter	Not Common Resident
FAMILY- Anserini		
<i>Anser anser</i>	Greylag Goose	Not Common Winter Visitor
<i>Anser indicus</i>	Bar-headed Goose	Locally Common Winter Visitor
<i>Nettion coromandelianus</i>	Cotton Pygmy- goose	Locally Common Resident
<i>Sarkidiornis melanotos</i>	Comb Duck	Not Common Resident
<i>Tadorna ferruginea</i>	Ruddy Shelduck	Locally Common Winter Visitor
<i>Tadorna tadorna</i>	Common Shelduck	Not Common Winter Visitor
FAMILY- Apodidae		
<i>Apus affinis (including nipalensis)</i>	House Swift	Locally Common Resident
<i>Cypsiurus balasensis</i>	Asian Palm- Swift	Not Common Resident
FAMILY- Ardeidae		
<i>Ardeacinerea</i>	Grey Heron	Locally Common Resident
<i>Ardeolagrayii</i>	Indian Pond Heron	Locally Common Resident
<i>Bubulcus ibis</i>	Cattle Egret	Locally Common Resident
<i>Casmerodius albus</i>	Great Egret	Locally Common Resident
<i>Egretta garzetta</i>	Little Egret	Locally Common Resident
<i>Mesophoxys intermedia</i>	Intermediate Egret	Locally Common Resident
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	Locally Common Resident
FAMILY- Bucerotidae		
<i>Ocyrocus birostris</i>	Indian Grey Hornbill	Not Common Resident
FAMILY- Burhinidae		
<i>Burhinus oedipnemus</i>	Eurasian Thick- knee	Locally Common Resident
FAMILY- Caprimulgidae		
<i>Caprimulgus asiaticus</i>	Indian Nightjar	Not Common Resident
FAMILY- Carduelinae		

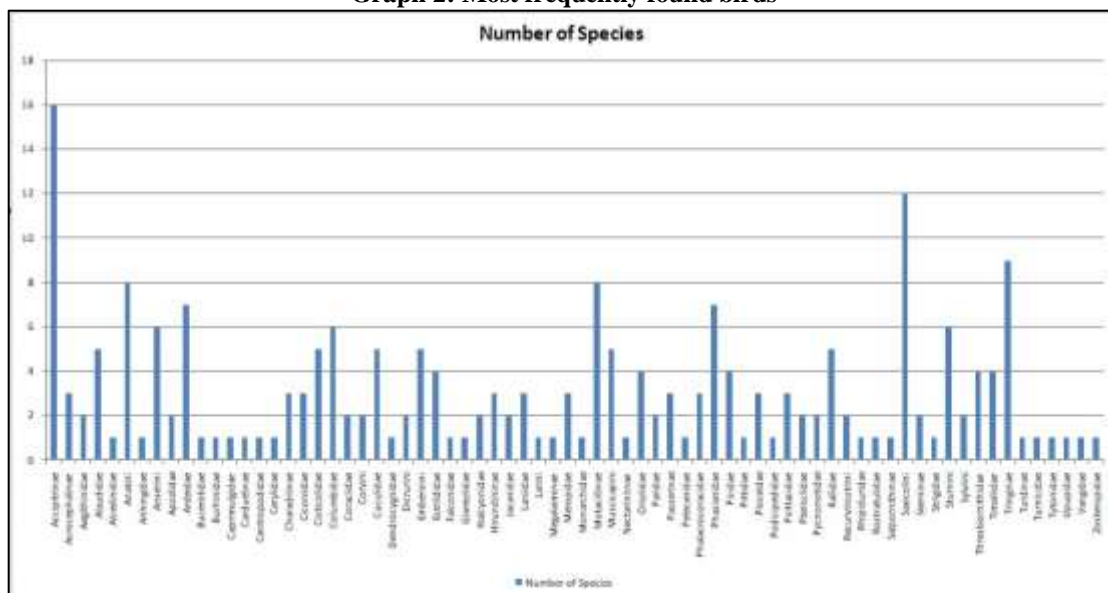
<i>Carpodacus erythrurus</i>	Common Rosefinch	Not Common Passage Migrant
FAMILY- Centropodidae		
<i>Centropus sinensis</i>	Greater Coucal	Common Resident
FAMILY- Cerylidae		
<i>Ceryle rudis</i>	Pied Kingfisher	Locally Common Resident
FAMILY- Charadriidae		
<i>Charadrius dubius</i>	Little Ringed Plover	Locally Common Resident
<i>Vanellus indicus</i>	Red-wattled Lapwing	Common Resident
<i>Vanellus malarbaricus</i>	Yellow-wattled Lapwing	Not Common Resident
FAMILY- Ciconiidae		
<i>Anastomus soscitans</i>	Asian Openbill	Locally Common Resident
<i>Ciconia episcopus</i>	Woolly-necked Stork	Locally Common Resident
<i>Mycteria leucocephala</i>	Painted Stork	Locally Common Resident
FAMILY- Cisticolidae		
<i>Cisticola juncidis</i>	Zitting Cisticola	Locally Common Resident
<i>Prinia gracilis</i>	Graceful Prinia	Locally Common Resident
<i>Prinia hodgsonii</i>	Grey-breasted Prinia	Not Common Resident
<i>Prinia inornata</i>	Plain Prinia	Locally Common Resident
<i>Prinia socialis</i>	Ashy Prinia	Locally Common Resident
FAMILY- Columbidae		
<i>Columba livia</i>	Rock Pigeon	Locally Common Resident
<i>Streptopelia chinensis</i>	Spotted Dove	Not Common Resident
<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Locally Common Resident
<i>Streptopelia senegalensis</i>	Laughing Dove	Locally Common Resident
<i>Streptopelia tranquebarica</i>	Red Collared Dove	Locally Common Resident
<i>Treron phoenicoptera</i>	Yellow-footed Green Pigeon	Locally Common Resident
FAMILY- Coraciidae		
<i>Coracias benghalensis</i>	Indian Roller	Common Resident
<i>Coracias garrulus</i>	European Roller	Not Common Passage Migrant
FAMILY- Corvini		
<i>Corvus splendens</i>	House Crow	Locally Common Resident
<i>Dendrocitta vagabunda</i>	Rufous Treepie	Locally Common Resident
FAMILY- Cuculidae		
<i>Cacomantis passerinus</i>	Grey-bellied Cuckoo	Not Common Summer Visitor
<i>Clamator jacobinus</i>	Pied Cuckoo	Not Common Summer Visitor
<i>Eudynamis scolopacea</i>	Asian Koel	Not Common Summer Visitor
<i>Hierococcyx varius</i>	Common Hawk Cuckoo	Not Common Summer Visitor
<i>Phaenicophaeus leschenaultii</i>	Sirkeer Malkoha	Not Common Resident
FAMILY- Dendrocygnidae		
<i>Dendrocygna javanica</i>	Lesser Whistling- duck	Not Common Resident
FAMILY- Dicrurini		
<i>Dicrurus caerulescens</i>	White-bellied Drongo	Not Common Resident
<i>Dicrurus macrocercus</i>	Black Drongo	Locally Common Resident
FAMILY- Emberizini		
<i>Emberiza bruniceps</i>	Red-headed Bunting	Not Common Winter Visitor
<i>Emberiza bucharani</i>	Grey-necked Bunting	Not Common Winter Visitor
<i>Emberiza stewarti</i>	White-capped Bunting	Not Common Winter Visitor
<i>Emberiza striolata</i>	House Bunting	Not Common Resident
<i>Melophus lathami</i>	Crested Bunting	Locally Common Resident
FAMILY- Estrildidae		
<i>Amandava amandava</i>	Red Avadavat	Not Common Resident
<i>Lonchura malabarica</i>	Indian Silverbill	Locally Common Resident
<i>Lonchura malacca</i>	Black-headed Munia	Not Common Resident
<i>Lonchura punctulata</i>	Scaly-breasted Munia	Not Common Resident
FAMILY- Falconidae		
<i>Falco tinnunculus</i>	Common Kestrel	Locally Common Winter Visitor
FAMILY- Glareolidae		
<i>Cursoriu scoromandelicus</i>	Indian Courser	Not Common Resident
FAMILY- Halcyonidae		
<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Common Resident
FAMILY- Hirundininae		
<i>Hirundo daurica</i>	Red-rumped Swallow	Not Common Resident
<i>Hirundo smithii</i>	Wire-tailed Swallow	Not Common Resident

<i>Riparia paludicola</i>	Plain Martin	Not Common Resident
FAMILY- Jacanidae		
<i>Hydrophasianus chirurgus</i>	Pheasant-tailed Jacana	Locally Common Summer Visitor
<i>Metopidius indicus</i>	Bronze-winged Jacana	Locally Common Summer Visitor
FAMILY- Laniidae		
<i>Lanius meridionalis</i>	Southern Grey Shrike	Common Resident
<i>Lanius schach</i>	Long-tailed Shrike	Common Resident
<i>Lanius vittatus</i>	Bay-backed Shrike	Locally Common Resident
FAMILY- Larini		
<i>Larus ichthyaetus</i>	Pallas's Gull	Not Common Passage Migrant
FAMILY- Megalaiminae		
<i>Megalaima haemacephala</i>	Coppersmith Barbet	Locally Common Resident
FAMILY- Meropidae		
<i>Merops orientalis</i>	Green Bee-eater	Locally Common Resident
<i>Merops persicus</i>	Blue-cheeked Bee-eater	Locally Common Summer Visitor
<i>Merops philippinus</i>	Blue-tailed Bee-eater	Not Common Passage Migrant
FAMILY- Monarchidae		
<i>Terpsiphone paradisi</i>	Asian Paradise- flycatcher	Not Common Summer Visitor
FAMILY- Motacillinae		
<i>Anthus campestris</i>	Tawny Pipit	Not Common Winter Visitor
<i>Anthus hodgsoni</i>	Olive-backed Pipit	Not Common Winter Visitor
<i>Anthus rufulus</i>	Paddyfield Pipit	Locally Common Resident
<i>Anthus similis</i>	Long-billed Pipit	Not Common Winter Visitor
<i>Anthus trivialis</i>	Tree Pipit	Not Common Winter Visitor
<i>Motacilla cinerea</i>	Grey Wagtail	Not Common Winter Visitor
<i>Motacilla citreola</i>	Citrine Wagtail	Not Common Winter Visitor
<i>Motacilla flava</i>	Yellow Wagtail	Not Common Winter Visitor
FAMILY- Muscicapini		
<i>Culicicapa ceylonensis</i>	Grey-headed Canary Flycatcher	Not Common Winter Visitor
<i>Cyornis tickelliae</i>	Tickell's Blue Flycatcher	Not Common Resident
<i>Eumyias thalassina</i>	Verditer Flycatcher	Not Common Winter Visitor
<i>Ficedula parva</i>	Red-throated Flycatcher	Not Common Passage Migrant
<i>Muscicapa dauurica</i>	Asian Brown Flycatcher	Not Common Resident?
FAMILY- Nectariniinae		
<i>Nectarinia asiatica</i>	Purple Sunbird	Locally Common Resident
FAMILY- Oriolidae		
<i>Coracina macei</i>	Large Cuckooshrike	Not Common Resident
<i>Coracina melanoptera</i>	Black-headed Cuckooshrike	Not Common Resident
<i>Oriolus oriolus</i>	Eurasian Golden Oriole	Locally Common Summer Visitor
<i>Pericrocotus cinnamomeus</i>	Small Minivet	Locally Common Resident
FAMILY- Paridae		
<i>Parus major</i>	Great Tit	Locally Common Resident
<i>Parus nuchalis</i>	White- naped Tit	Not Common Resident
FAMILY- Passerinae		
<i>Passer domesticus</i>	House Sparrow	Locally Common Resident
<i>Passer hispaniolensis</i>	Spanish Sparrow	Locally Common Resident
<i>Petronia xanthocollis</i>	Chestnut-shouldered Petronia	Locally Common Resident
FAMILY- Pelecanidae		
<i>Pelecanus onocrotalus</i>	GreatWhite Pelican	Not Common Winter Visitor
FAMILY- Phalacrocoracidae		
<i>Phalacrocorax carbo</i>	Great Cormorant	Locally Common Resident
<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	Locally Common Resident
<i>Phalacrocorax niger</i>	Little Cormorant	Locally Common Resident
FAMILY- Phasianidae		
<i>Coturnix coturnix</i>	Common Quail	Not Common Resident
<i>Francolinus francolinus</i>	Black Francolin	Locally Common Resident
<i>Francolinus pondicerianus</i>	Grey Francolin	Locally Common Resident
<i>Galliperdix lunulata</i>	Painted Spurfowl	Not Common Resident
<i>Pavo cristatus</i>	Indian Peafowl	Locally Common Resident
<i>Perdica argoondah</i>	Rock Bush Quail	Locally Common Resident
<i>Perdica asiatica</i>	Jungle Bush Quail	Locally Common Resident
FAMILY- Picidae		
<i>Dendrocopos smahrattensis</i>	Yellow-crowned Woodpecker	Locally Common Resident

<i>Dendrocopos nanus</i>	Brown-capped Pygmy Woodpecker	Not Common Resident
<i>Dinopium benghalense</i>	Black- rumped Flameback	Not Common Resident
<i>Jynx torquilla</i>	Eurasian Wryneck	Not Common Winter Visitor
FAMILY- Pittidae		
<i>Pitta brachyura</i>	Indian Pitta	Not Common Summer Visitor
FAMILY- Ploceidae		
<i>Ploceus benghalensis</i>	Black-breasted Weaver	Not Common Resident
<i>Ploceus manyar</i>	Streaked Weaver	Not Common Resident
<i>Ploceus philippinus</i>	Baya Weaver	Locally Common Resident
FAMILY- Podicipedidae		
<i>Tachybaptus ruficollis</i>	Little Grebe	Locally Common Resident
FAMILY- Psittacidae		
<i>Psittacula cyanocephala</i>	Plum-headed Parakeet	Not Common Resident
<i>Psittacula eupatria</i>	Alexandrine Parakeet	Not Common Resident
<i>Psittacula krameri</i>	Rose-ringed Parakeet	Common Resident
FAMILY- Pteroclididae		
<i>Pterocles exustus</i>	Chestnut-bellied Sandgrouse	Common Resident
<i>Pterocles indicus</i>	Painted Sandgrouse	Locally Common Resident
FAMILY- Pycnonotidae		
<i>Pycnonotus cafer</i>	Red-vented Bulbul	Locally Common Resident
<i>Pycnonotus leucotis</i>	White-eared Bulbul	Locally Common Resident
FAMILY- Rallidae		
<i>Amaurornis akool</i>	Brown Crake	Not Common Resident
<i>Fulica atra</i>	Common Coot	Locally Common Resident
<i>Gallinula chloropus</i>	Common Moorhen	Locally Common Resident
<i>Porphyrio porphyrio</i>	Purple Swampphen	Locally Common Resident
<i>Porzana pusilla</i>	Baillon's Crake	Not Common Winter Visitor
FAMILY- Recurvirostrini		
<i>Himantopus himantopus</i>	Black-winged Stilt	Locally Common Resident
<i>Recurvirostra avosetta</i>	Pied Avocet	Not Common Winter Visitor
FAMILY- Rhipiduridae		
<i>Rhipidura aureola</i>	White- browed Fantail	Locally Common Resident
FAMILY- Rostratulidae		
<i>Rostratula benghalensis</i>	Greater Painted-snipe	Not Common Summer Visitor
FAMILY- Salpornithinae		
<i>Salpornis spilonotus</i>	Spotted Creeper	Not Common Resident
FAMILY- Saxicolini		
<i>Cercomela fusca</i>	Brown Rock-chat	Locally Common Resident
<i>Cercotrichas galactotes</i>	Rufous- tailed Scrub Robin	Not Common Passage Migrant
<i>Copsychus saularis</i>	Oriental Magpie Robin	Locally Common Resident
<i>Luscinia svecica</i>	Bluethroat	Common Passage Migrant
<i>Oenanthe deserti</i>	Desert Wheatear	Common Winter Visitor
<i>Oenanthe isabellina</i>	Isabelline Wheatear	Common Winter Visitor
<i>Oenanthe picata</i>	Variable Wheatear	Common Winter Visitor
<i>Phoenicurus ochruros</i>	Black Redstart	Common Winter Visitor
<i>Saxicola caprata</i>	Pied Bushchat	Common Resident
<i>Saxicola ferrea</i>	Grey Bushchat	Not Common Winter Visitor
<i>Saxicola torquata</i>	Common Stonechat	Common Winter Visitor
<i>Saxicoloides fulicata</i>	Indian Robin	Locally Common Resident
FAMILY- Sterninae		
<i>Sterna aurantia</i>	River Tern	Locally Common Resident
<i>Athene brama</i>	Spotted Owlet	Locally Common Resident
FAMILY- Strigidae		
<i>Otus bakkamoena</i>	Collared Scops Owl	Not Common Resident
FAMILY- Sturnini		
<i>Acridotheres ginginianus</i>	Bank Myna	Locally Common Resident
<i>Acridotheres tristis</i>	Common Myna	Locally Common Resident
<i>Sturnus contra</i>	Asian Pied Starling	Not Common Resident
<i>Sturnus pagodarum</i>	Brahminy Starling	Locally Common Resident
<i>Sturnus roseus</i>	Rosy Starling	Locally Common Winter Visitor
<i>Sturnus vulgaris</i>	Common Starling	Not Common Winter Visitor
FAMILY- Sylviini		
<i>Sylvia curruca</i>	Lesser Whitethroat	Common Winter Visitor

<i>Sylvia hortensis</i>	Orphean Warbler	Not Common Winter Visitor
FAMILY- Threskiornithidae		
<i>Platalea leucorodia</i>	Eurasian Spoonbill	Locally Common Resident
<i>Plegadis falcinellus</i>	Glossy Ibis	Not Common Resident
<i>Pseudibis papillosa</i>	Black Ibis	Locally Common Resident
<i>Threskiornis melanocephalus</i>	Black-headed Ibis	Locally Common Resident
FAMILY- Timaliidae		
<i>Chrysomma sinense</i>	Yellow-eyed Babbler	Locally Common Resident
<i>Turdoides caudatus</i>	Common Babbler	Locally Common Resident
<i>Turdoides malcolmi</i>	Large Grey Babbler	Locally Common Resident
<i>Turdoides striatus</i>	Jungle Babbler	Not Common Resident
FAMILY- Tringinae		
<i>Actitis hypoleucos</i>	Common Sandpiper	Not Common Winter Visitor
<i>Calidris minuta</i>	Little Stint	Locally Common Winter Visitor
<i>Calidris temminckii</i>	Temminck's Stint	Locally Common Winter Visitor
<i>Limosa limosa</i>	Black-tailed Godwit	Locally Common Winter Visitor
<i>Philomachus pugnax</i>	Ruff	Locally Common Winter Visitor
<i>Tringa glareola</i>	Wood Sandpiper	Not Common Winter Visitor
<i>Tringa nebularia</i>	Common Greenshank	Not Common Winter Visitor
<i>Tringa ochropus</i>	Green Sandpiper	Not Common Winter Visitor
<i>Tringato tanus</i>	Common Redshank	Locally Common Winter Visitor
FAMILY- Turdinae		
<i>Monticola solitarius</i>	Blue Rock Thrush	Locally Common Winter Visitor
FAMILY- Turnicidae		
<i>Turnix suscitator</i>	Barred Buttonquail	Not Common Resident
FAMILY- Tytonidae		
<i>Tyto alba</i>	Barn Owl	Not Common Resident
FAMILY- Upupidae		
<i>Upupa epops</i>	Common Hoopoe	Common Resident
FAMILY- Vangidae		
<i>Tephrodornis pondicerianus</i>	Common Woodshrike	Locally Common Resident
FAMILY- Zosteropidae		
<i>Zosterops palpebrosus</i>	Oriental White-eye	Locally Common Resident

Graph 2: Most frequently found birds



Conclusion:

The findings of this study showed that there were 218 families of bird species, with the maximum number seen during the winter season and the lowest number during the summer season. The diverse ecosystems in Jhalawar harbour a wide array of avian species, underscoring the significance of the area. However, the richness of bird species in these environments is significantly impacted by anthropogenic influences. There is an immediate necessity to implement conservation measures that would focus on improving wildlife habitat management initiatives in the division.

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