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RESEARCH ARTICLE

ECONOMIC PERSPECTIVES ON AVIAN BIODIVERSITY IN CHANDIGARH: A FOCUS ON SUKHNA WETLAND

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Abstract

Birds form an important component of an ecosystem. Complex relationships exist between them and their biotic and abiotic environment. To understand these relationships, it becomes necessary to study different ecological aspects of birds and their environment. Present study entitled "Avian Biodiversity In Chandigarh With Special Reference To Sukhna Wetland was carried out from December 2023 to March 2024 at Sukhna Wetland, Chandigarh.During the study period varying from December 2023 to March 2024, Bird community in and around Sukhna Wetland, Chandigarh represented nearly 12 aquatic waterfowls and many other avifauna. Out of twelve species, Pintail, Mallard and Greylag goose were most abundant species. The population of all the other species of birds likes Blue Rock Pigeons (Columba livia) (23.72%) Spotted Doves (Streptopelia chinensis), (7.62%) Red-wattled Lapwings (Vanellus indicus) (6.77%) House Crows (Corvus splendens), (11.01%) Common Mynas (Acridotheres tristis) (15.25%) Common Kingfisher (Alcedo atthis) (6.77%) White-breasted Kingfisher (Halcyon symrnensis) (11.86%) White Wagtails (Motacilla alba) (16.94%) also varied throughout the study period. It can be concluded that some species occur throughout the year whereas other species may be present only during winter migratory season or for Breeding.

Introduction:-

Birds form an important component of an ecosystem. Complex relationships exist between them and their biotic and abiotic environment. To understand these relationships, it becomes necessary to study different ecological aspects of birds and their environment. Keeping these aspects in mind, the Sukhna Lake (3 sq km Rainfed Lake) in the foothills of Shivalik range was selected for the present study area (which is one of the greatest gifts from Le Corbusier and P. L. Verma Chief Engineer). The lake and its heavily wooded shores constitute a Nationally Protected Wetland. The Government of India has declared the Lake as a Protected National Wetland. This is a favorite spot for Bird Watchers. Each species of bird occupies a definite geographical range and habitat. The birds are famous for attractive colors, beaks and foot forms, flying style, and behavior such as call notes, sexual dimorphism, courtship, seasonal migration, art of nest building and parental care.

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Bird Migration refers to the regular seasonal journeys of varying distances undertaken by many species of Birds. The movements of birds include those made in response to changes in Food Availability, Habitat or Weather. These however are usually irregular and are termed variously as nomadism, invasions or irruptions. Migration is marked by its annual seasonality. Sukhna is a sanctuary for many exotic migratory birds like the Siberian Cranes, Storks and Duck, during the winter months. From December through February, aside from scores of local species, one can see many Exotic Species of aquatic birds from Central Asia and Siberia that finds the lake a pleasant place to pass the winter. Sukhna Wetland, Chandigarh being Protected National Wetland is the favourite sanctuary for migratory birds for passing the winter months of December through March. The Chandigarh Bird Club conducts surveys to identify and monitor bird species at Sukhna Lake from time to time.

Literature Review:-

The relevant literature available on various aspects of birds covered under the 'Avian Biodiversity in Chandigarh with Special Reference to Sukhna Wetland would be discussed under the following subheadings:

(1) Bird Population Structure
(2) Behavioral Aspects of Birds
(3) Bird Migration

Bird Population Structure

Bird Population Structure**:** Populations are fundamental units of ecology; they are the major components of communities and ecosystems (Brooks et al 1990). To know the Population Structure of various bird species in a particular area referred as community structure, it becomes essential to measure their relative abundance and fluctuations during different part of the years. For assuming and comparing the densities of bird species in different habitats or over different seasons in the same habitat the various census methods would be used to collect the data (Verner, 1985). Like transects, Point count method can also be used effectively to assess the population of birds without taking in account the distance of observer to birds or counting the birds within a fixed radius. In point count, without distant estimate, all birds detected irrespective of distance from the observer are counted. However, used in which the birds detected in an inner circle of fixed radius are recorded separately from all birds detected beyond the radius. In circular plots the same fixed radius is used for all species (Verner, 1985). Point counts are basically transecting counts done at zero speed. (Burham et al., 1981).

Community Structure

A community is any assemblage of population of living organism in a prescribed area or habitat (Krebs, 1978). Since, large numbers of birds are found in an aquatic ecosystem, the structure of the community is described as a unit (Krebs, 1978). In general, three indices viz. Species richness, diversity and evenness or equitability are used to quantify the structure of bird communities ((Krebs, 1978; Verner, 1985; Toor et al., 1986; Dhindsa et al., 1988).

Behavioural Aspects Of Birds Nesting

Studies on nests and nesting behavior of birds have received relatively much less attention than food or habitat parameters of birds, perhaps for many nesting species suitable nest sites are presumed to be readily available and therefore not a resource, over which competition is likely to occur. In groups, such as hole nesters or sea birds, however, nesting requirements are specialized and suitable location may be difficult to obtain. In Australia, 18% of the terrestrial species are known to use tree hollows for nesting and 21% of the non-passerine species are obligate hole nesters i.e., not capable of excavating cavities by themselves (Saunders et al 1982, 1985). Nest site selection is considered to be an important component of habitat selection by birds (Hilden, 1965). According to Conner et al (1976) and Kilham (1971) primary nesting birds have specific requirement for nest sites. Some birds prefer dense canopy trees, which provide protection to their nests and contents by concealments, probably to detect the predators. Large birds nest high up on trees or at the top of buildings whereas smaller birds build nest in the lower canopy. Tyagi and Lamba (1984) reported only six tree species used for nesting by Pied myna, whereas Gupta and Bajaj (1991) reported 18 and Pandey (1991) reported 29, Sandhu (1993) observed that Pied myna used 24 different tree species as nesting sites followed by Common Myna (16 tree species). House Crow (15), Ring Dove (12), Rose Ringed Parakeet (8) and Black Drongo (7). Cavity nesters preferred the tree with larger diameters (Runde and Capen, 1987). Scarcity of suitable nesting sites and some other factors have compelled some birds to nest at odd places like transmission line substrate and telephone poles (Toland, 1990; Gupta and Bajaj, 1991).

Birds select appropriate nest materials on the basis of availability, specific cues and early experience (Ali and Ripley, 1983). Nests are occasionally built of artificial wire, spun glass, cotton, string, or cement depending on the

availability and resemblance to the usual nest material (Collias and Collias, 1984) and the yellow-headed Blackbird, a Marsh inhabitant of the United States (Harrison, 1979) use dead plant materials soaked in water for weaving. Balen et al (1982) found occupancy of natural nest cavities ranging from 54% to 93 % in different areas and in mixed.

As per literature very little, scattered and unsystematic information is available on nest structure and nesting behaviour of Indian Birds (Ali and Ripley, 1983). Indian Myna (Acridothreres tristis) a familiar urban species has been described as a hole nester and has been reported to exhibit nesting activity as the predominant activity during daytime, which is decreased slightly in the afternoon (Mahabal, 1993). The nest of Common Myna usually made in the holes in the trees mostly, comprised, feathers, fine twigs, leaves, paper, wrap of cigarette packets, cast-off snake skin, cotton etc. (Singh, 1972). Nest holes of Common myna have also been reported in rock faces, vertical earth banks, walls of buildings and wells (Whistler, 1963). Toor and Dhindsa (1980) reported nesting of Common myna in Wheat hay stacks which consisted a slit at the top of the keep by putting out straw and an entrance hole at the bottom of the slit. Nests of House sparrow have been found to be in the holes in the walls of houses and wells in the roofs of houses and in dense bushes and trees by using straw rags, pieces of paper combs etc. (Ali and Ripley, 1983) Nests of Rose ringed parakeet had been found to be extended to be 5 to 10 cm with a chamber portion of the never less than 10 to 13 cm in diameter.

Bird Migration

Bird migration is primarily, but not entirely, a Northern Hemisphere phenomenon. Many Northern-Breeding Ducks, Geese and Swans are Long-distance Migrants. The primary physiological cue for migration is the changes in the day length. These changes are also related to hormonal changes in the birds. Over a million Migratory Ducks, Teals, Geese including waders come to Bharatpur Sanctuary during the winter from far distant temperate regions of Eurasia, making it a truly international community of bird, unique in its richness and variety (Saharia, 1998).

Bhindawas Bird Sanctuary, 17 Km from Jhajjar, is spread over 1,017 acres. The arrival of large number of migratory at Bhindawas bird sanctuary during the winter for the past couple of years has attracted the attention of the tourist and bird lovers. Wildlife officials recorded the arrival of 15,000 to 20,000 feathered guests from overseas during the winter. The birds start arriving here by mid-October and stay till February end. These include Cormorants, Pintail, Egret, Shelduck, Bar-headed Goose, Comb Duck, White-throated Kingfisher, Green Bee Eater, Black Drongo, Pied Cuckoo, Common Hawk Cuckoo etc.

Sultanpur National Park is located in Gurgaon district of Haryana, about 50 Kms from Delhi and 15 Kms from Gurgaon-Farukh Nagar Road. The world famous ornithologist, Mr. Peter Jackson, recognized its sanctuary potential. Keeping in view its importance and potential, the area covering 359 acres was declared a Bird Sanctuary in 1971 and was upgraded to status of National Park by Haryana Government.

With the protection of area and the rapid development of its habitat during the past 20 years, it has become a 'Paradise' for Migratory and Local Birds. In Sultanpur, 250 Bird Species have been recorded; 150 are resident, some are local migratory, while others come from Northern Regions like Siberia, Europe and Afghanistan. Every year, 90 migratory birds species arrive here in search of feeding grounds and to pass the winter. In winter, sanctuary provides a picturesque panorama of migratory birds such as Rosy Pelican, Spotted Sandpiper, and Starling Blue Throat. The common resident species are Little Egret, Painted Stork, White Ibis, Little Brown Dove, Indian Crested Lark, Myna, Red Vented Bulbul, Magpie Robin, and Weaver Birds. In summer, 11 species of birds such as Koel and Cuckoos can be recognized by their melodious songs.

The Sukhna Lake (3 Sq Km Rainfed Lake) in the Foothills of Shivalik range is a sanctuary for many exotic migratory birds like the duck, storks and cranes, during the winter months.

Research Objectives:-

The present study of Avian Biodiversity in Chandigarh with Special Reference to Sukhna Wetland was designed with the following research objectives.

- To examine bird population structure and migration through an ecological economics perspective.
- To analyze bird behavior and social interactions in the context of resource allocation and cooperation.

Research Methodology:-

Present study entitled "Avian Biodiversity in Chandigarh with Special Reference to Sukhna Wetland''was carried out from Dec 2023 to March 2024 at Sukhna Wetland, Chandigarh. Sukhna Wetland, Chandigarh, spread over an area of 3 sq. km presented a unique aquatic habitat consisting of tree plantation (on the periphery of the wetland) as well as raised platform (for various activities) in the mid of the lake view. Sukhna Wetland was easily approachable through main road on the extreme boundaries as well as through boats on the water surface for viewing and studying the various aspects of birds.

Identification of Birds:

Identification of birds was done on the basis of visual observations on their morphological characteristics viz. shape, size and colour of beak, wings, eyes, feathers, legs etc by using binocular and comparing them with those described by Ali (1996).

Population Structure:

Population Structure of various bird species occurring at sukhna wetland was studied by using Point Count Method (around the raised platform of lake) (Verner, 1985).

Point Count Method:

Point Count Method was used for measuring the population structure of birds at Sukhna Wetland using the raised platform (for various activities) in the mid of the lake view. The identification of birds was done with the help of binoculars and the numbers of birds were counted for only 10 minutes at the same time of day till the birds were countable. Observations were made at fortnightly intervals during the period extending from December 2023 to March 2024.

Statistical Analysis

The counts of birds were pooled and the following characteristics were calculated to quantify the population structure.

- Relative Abundance **(%):** $n_i /N \times 100$, where n_i is the number of birds of the ith species and N is the total number of birds of the all species.
- Bird Density**:** Bird Density is the number of birds per unit area.

Result and Discussion:-

Present Studies revealed heterogeneous distribution of birds in different types of habitats, viz., along roadside of Lake and in and around the surrounding as well as in the Lake. Survey of **Sukhna Wetland** revealed the occurrence of various Migratory and other birds' species in and around Sukhna Lake during the study period i.e. **Dec 2023 to March 2024**. The Record of birds Species in and around Sukhna Lake is shown in the following table.

Table 1:- Bird Species recorded in and around Sukhna Lake, Chandigarh.

Sr. No.	Common Name	Scientific Name	Family	Point Count	Abundance
1.	**Northern Pintail**	Anas acuta	Anatidae	200	**12.79**
2.	**Wigeon**	Anas penelope	Anatidae	155	9.91
3.	**Common Pochard**	Aythya ferina	Anatidae	108	6.90
4.	**Tufted Pochard**	Aythya fuligula	Anatidae	95	6.07
5.	**Common Teal**	Anas crecca	Anatidae	162	10.36
6.	**Spotbill**	Anas poecilorhyncha	Anatidae	175	**11.19**
7.	**Mallard**	Anas platyrhynchos	Anatidae	200	**12.79**
8.	**Shoveller**	Anas clypeata	Anatidae	135	8.63
9.	**Greylag Goose**	Anser anser	Anatidae	90	5.75
10.	**Coot**	Fulica atra	Rallidae	100	6.39
11.	**Openbill Stork**	Anastomus oscitans	Ciconiidae	75	4.79
12.	**Ruddy Shelduck**	Tadorna ferriginea	Anatidae	68	4.35
	Total			**1563**	
OTHER BIRDS SPECIES					

13	**Blue Rock Pigeons**	Columba livia	Columbidae	28	**23.72**
14	**Spotted Doves**	Streptopelia chinensis	Columbidae	09	7.62
15	**Red-wattled Lapwings**	Vanellus indicus	Charadriidae	08	6.77
16	**House Crows**	Corvus splendens	Corvidae	13	11.01
17	**Common Mynas**	Acridotheres tristis	Sturnidae	18	**15.25**
18	**White-breasted Kingfisher**	Halcyon symrnensis	Alcedinidae	14	11.86
19	**Common Kingfisher**	Alcedo atthis	Alcedinidae	08	6.77
20	**White Wagtails**	Motacilla alba	Motacillidae	20	**16.94**
	Total			**118**	

Among aquatic waterfowls, Ducks, and Geese are the most beautiful of all birds. They are included in the family anatidae and are often referred to as the anatids. Among the first birds to be domesticated, ducks and geese have been raised as a food source for more than 4,500 years and all domestic varieties have been derived from the Mallard, Muscouy, Greyley and Swan Goose. The common aquatic birds like Coot, Greylag Goose, Mallard, Common Teal, Pintail, Common Pochard, Tufted Pochard, Ruddy Shelduck, Shoveller, Spotbill, Wigeon and others were abundantly recorded during the various visits to Sukhna Wetland, Chandigarh.

Besides aquatic birds, many other species of birds like Blue Rock Pigeons (Columba livia) (23.72%) Spotted Doves (Streptopelia chinensis), Red-wattled Lapwings (Vanellus indicus), House Crows (Corvus splendens), Common Mynas (Acridotheres tristis) (15.25%) Common Kingfisher (Alcedo atthis) White-breasted Kingfisher (Halcyon symrnensis), White Wagtails (Motacilla alba) (16.94%) and others were also observed.

Identification Of Birds

The Pintail (Anas acuta) is nearly of the size of a Domestic Duck. The following field characters of the drake were noticed: Upper plumage penciled chocolate, with white band on either side running down into the white neck and under parts. Long, pointed pin-like feather projecting well beyond the tail, usually sufficiently diagnostic. While in case of Duck, the following characters were noticed: Molted brown and buff with characteristic elongated body and tapering tail, but without the pins. Pairs, or flocks, on reed fringed vegetation covered jheels. One of our commonest migrant duck is largely vegetarian in its food preferences; Grubs in squelchy mud in inundated cultivation and on grassy tank margins. Also up-ends in shallow water. The Nesting Season is from May to July. While Nest is a depression in gross in open marshy grassland, compactly lined with rushes and down-feathers. The Eggs are 7 to 12, pale sea green with a buffish-tinge. One of the commonest bird seen at Sukhna Lake, Chandigarh (Ali, 1996).

The Common Teal (Anas crecca) is also of the size of a Domestic Duck. The following field characters of the drake were noticed: Male penciled grayish, with chestnut head and a broad metallic green band running backward from eye to nape, bordered above and below by whitish lines. A tricoloured wing speculum in Black, Green and Buff-particularly conspicuous in flight. While the Female was molted dark and light brown, with pale underparts and black and green speculum. Flocks on tanks, jheels and Marshes etc. Perhaps our commonest migratory duck and an excellent sporting bird, swift on the wing and good for the table. The common teal is largely vegetarian in its diet, grubbing for grain and tender shoots of rise and marsh plants in squelchy mud of inundated paddy fields and grassy tanks margins. Also up-ends in shallow water. The call is low toned krit uttered by the drake, and a subdued wheezy quack by the duck. The Nesting Season is April to June and the Nest is made up of reeds, rushes etc., lined with down, on the edge of swamps; The Eggs are 7 to 10, cream coloured, with a glassy texture (Ali, 1996).

The Spotbill (Anas poecilorhyncha) is also of the size of a Domestic Duck. The following field characters were noticed: large size, scaly patterned light and dark brown plumage, and the white and the metallic green wing bar or speculum were leading pointers. Bright orange-red legs, yellow-tipped dark bill with 2 orange-red spots at its base (one on either side of the forehead), confirms the diagnosis. Sexes alike; Pairs or small flocks on jheels. One of our most widely distributed resident ducks, but nowhere really abundant. It is among the species that seem fully conscious of their good qualities as sporting and edible birds, and one of the first to make itself scarce when gunfire commences on a jheel. The Spotbill takes chiefly vegetable matter. A surface feeder obtaining it's food chiefly by tipping or 'up-ending' in shallow water. When reaching down for food thus, the tail end of the bird sticks out comically above the

surface, the vertical stance being maintained by a kicking of the legs. The call is a hoarse wheezy note by the drake, and a loud quack by the duck, particularly when alarmed, otherwise very silent on the whole. The Nesting Season is not rigidly defined; chiefly July to September (SW Monsoon). The Nest is a pad of grass and weed amongst herbage on marshy margins of tanks. The eggs are 6 to 12, grayish buff or greenish white (Ali, 1996).

The Mallard (Anas platyrhynchus) is also of the size of a Domestic Duck. The following field characters were noticed: Drake largely grey above and below, finely penciled and vermiculated with Black glistening Dark Green Head and Neck separated from Chestnut Breast by narrow White Collar. Rump, tail-coverts, and two uncurled central tail feathers black. Metallic purplish blue 'mirror' on wing bordered in front and behind by black and white lives, conspicuous in flight. Yellowish green bill; orange legs. The Duck (Plumage): Brown and buff streaked and spotted with black orange legs. Distinguished from the very similar female speculum (as against green). Parties or flocks on reedy shallow jheels. A typical surface feeding or dabbling duck, the ancestor of our domestic breeds; largely vegetarian. Dabbles for food as it walks about on a marsh, or tips ('up-ends') in water with foreparts of body submerged, tail sticking comically skyward. A fast flier, excellent for the table, and much sought after by sportsmen. The call of a drake is normally a wheezy murmur; of duck a loud quack-quack, especially when alarmed and rising, almost vertically, off the water. The nesting Season is May/June and the nest is a pad of rushes and weeds thickly lived with down, under a bush or grass clump near edge of lake. The eggs are 6 to 10, greenish grey to yellowish stone (Ali, 1996).

The Wigeon (Anas penelope) is also of the size of a Domestic Duck. The following field characters were noticed: General aspects of drake grey: The chestnut head with Cream Coloured patch on fore crown, Brownish Pink Breast, Black Tail Coverts, large horizontal white patch on closed wing, and small narrow blue-grey bill, are diagnostic points. In flight a broad white shoulder patch near leading edge of wing, and the whitish 'bold' fore crown, are conspicuous. Flocks on shallow, reedy jheels and marshes. It is frequently found near shallow grassy jheels and marshes. A mixed surface feeder, largely vegetarian. Besides up-ending in shallow water for food, is often seem walking about on marshes graying on grass shoots and aquatic weeds in the manner of geese. A swift and powerful flier, with a peculiar rustling sound of wings. Like other coveted sporting ducks, e.g., mallard, pintail and gadwall, is usually amongst the first species to climb high and get well out of gunshot soon after firing has commenced on a jheel. A shrill pipe or whistle is uttered in flight as well as on the ground and when swimming (Ali, 1996).

The Shoveller (Anas clypeata) is also of the size of a Domestic Duck. The following field characters of drake were noticed: Head and Neck Glossy Dark Green; Breast White; rest of underparts mostly chestnut. Pale blue on forewing, with a white bar between it and the metallic green speculum. The Duck is mottled dark brown and buff, with grayish blue on wings, green speculum, and conspicuous bright orange bill (at base). Broadened Shovel-Shaped Bill and Orange Legs diagnostic in both sexes. Parties, and small flocks, on jheels, irrigation reservoirs, village tanks etc. Another of the more common migratory ducks visiting us in winter, and amongst the last to leave. The peculiar spatulate bill is adopted to its special method of feeding. Swims with neck and bill stretched rigidly in front, the lower manible immersed and furrowing the water while the upper is exposed and skims flat along the surface. The minute food particles so collected are strained out by means of the comb-tooth edges of the bill. Occasionally also tips or 'up-ends' in shallow water. The food is largely of animal matter. It is not exacting in its food preferences, and therefore its flesh in usually rank and unpalatable. But in flight and other respects it is a good sporting bird. The Nesting Season is April to June. The Nest is a pad of grass and rushed, on marshes etc. The Eggs are 7 to 16, pale stone or buff, sometimes with a greenish tinge (Ali, 1996).

The Common Pochard (Aythya ferina) is also of the size of a Domestic Duck. The following field characters were noticed: Base and tip of bill black, pale plumbeous to slate blue in between. Absence of white wing-bar, which is dull grey, distinguishes both sexes from other Pochard. The Breeding Drake: Head and neck chestnut-red; upper back and breast black otherwise back light grey vermiculated with black. Rump and tail-coverts black, ventrally and sides grayish white. Speculum dull grey. The Duck: rufous-brown on head, neck, upper back and breast, otherwise grayish brown with faint vermiculation on back and scapular cheeks, throat and box of bill buff. One of the commonest & earliest visitors to Sukhna Lake; Seen in large flocks and rafts of over 300 to several thousands in the open waters of jheels and reservoirs with submerged vegetation. The Common Pochard is omnivorous but largely vegetarian (Ali, 1996).

The Tufted Pochard (Aythya fuligula) is also of the size of a Domestic Duck. The following field characters were noticed: The boldly contrasting Black and White Plumage of the drake, and the limp occipital tuft, prominent when

seen in profile, simplify identification at rest. In flight a broad white band along trailing edge of wing, in both sexes, provides a further clue. Duck Dark Brown whereas Drake Black, with no tuft and less white in lower plumage. Parties or small flocks on reed-fringed jheels and open irrigation tanks. Along with white-eyed Pochard one of our commonest migratory diving ducks, a group distinguished by the possession of a broadly lobed hind-toe. Legs set for back in the body, ill adapted for walking but admirably suited for diving and swimming both above and below the surface. Feeds in deep water by diving; hence often seen in open expanses in the middle of jheels and irrigation reservoirs. It can remain submerged for considerable periods and wounded birds are hard to retrieve, especially from vegetation-covered tanks where they hold on to weeds below the surface. The food is mainly molluscs, crustaceans, water insects as well as waterweeds (Ali, 1996).

The Coot (Fulica atra) is of the size of a Village Hen. The following field characters were noticed: A slaty black, dumpy, practically water bird, very duck like when swimming in a distance. The Ivory white pointed (Not Flat) bill and frontal shield (on forehead) are diagnostic. The peculiar lobed or scalloped toes are also characteristics. Sexes alike. Gregariously, on tanks and jheels. As a resident found sparingly on rush bordered irrigation tanks, etc. In winter numbers vastly augmented by immigrants from central and western Asia and then abundant on most jheels, especially in Northern India. Skitter along the water to take off, half running half flying; rises with much labour and patterning, but flies strongly when properly launched. The rapid almost hovering wing beats, the blunt barrel-shaped body and the legs trailing behind barrel-shaped body and the legs trailing behind rail-like, distinguish it from a duck in flight. The food consists of Grass and paddy shoots, aquatic weeds and insects, molluscs etc. The call is very clear and loud trumpet-like cry, often heard at night. The Nesting Season is principally July/August and the nest consists of a large compact mass of rushes among matted reeds slightly above water level. The eggs are 6 to 10, buffy stone-coloured, stippled and spotted with reddish brown or purplish brown or purplish black (Ali, 1996).

The Open bill Stork (Anastomus oscitans) is of the size of a White Stork;. The following field characters were noticed: A small white or grayish white stork, with black in the wings. In the distance rather like the white stork, but the peculiar reddish block bill with arching mandibles leaving a narrow gap between them is Diagnostic. Sexes were alike and twos or threes, or flocks, at jheels and marshes. Occasionally also tidal mudflats. One of our commonest storks with a wide and general distribution. General habits typical of the storks. The precise significance and function of the curiously shaped bill is obscure and calls for special investigation. It may have to do with opening the thick shells of the large Ampullaria Snails found on marshes, the soft body and viscera of which form a large proportion of its food in due season. It also eats frogs, crabs, large insects and other small living things. The Nesting Season is mostly between July and September in North India; Nov. to March in the south and in Sri Lanka. It Breeds in colonies amongst mixed heronries of cormorants, egrets, painted storks, etc. The nest is a circular platform of twigs with the central depression lined with leaves. The eggs are 2 to 4, white, close textured (Ali, 1996).

The Ruddy Shelduck or Brahminy Duck (Tadorna ferruginea) is also of the size of a Domestic Duck. The following field characters were noticed: A large Orange –Brown Duck with paler head and neck and sometimes a faint black collar at its base. Wings white, black and glistening green. Tail black. Female similar, but lacking the black collar and with much paler (almost whitish) head. Pairs or Parties, at open tanks and on shingle banks and river. Oftener seen on mud spits and sound banks than actually on water. Walks well and with ease, and grazes like a goose at water's edge. The food is vegetable matter, molluscs, crustaceans, aquatic insects, fish and reptiles. Occasionally said also to eat carrion in company with vultures. Seldom shot by sportsmen, but nevertheless is amongst the wariest and most vigilant of our ducks. The call is a nasal aang, aang, rather like a Barheaded Goose's honking in the distance, and also reminiscent of the cries of the Black Ibis. The Nesting Season: in Ladakh, Nepal and Tibet, it nearest nesting ground, April to June. The Nest is a thick pad of down feathers in holes in cliffs or even in a building, often at a considerable distance and height from water. The eggs are 6 to 10, pearly white, smooth textured (Ali, 1996).

The Greylag Goose (Anser anser) is also of the size of a Domestic goose. The following field characters were noticed: Similar to Brown Phase of Domestic Goose Grey rump and white nail to the flesh pink distinctive. Gregarious, in large flocks in Jheels, Rivers etc., where they rest during the day and feed at night on agricultural fields and wet meadows. Occasionally indulge in spectacular aerobatics. The call is a far-reaching aahng-ung-ungin flight and a conversational gay-gay-gay-gay while feeding. The food consists of vegetables, grass and winter crops, aquatic weeds and tubers. The Nesting: Extralimital- Asia Minor to Central Asia. Believed to be the ancestor of all our domestic breeds (Ali, 1996). All the above mentioned details of migratory water birds were taken from the Book of Indian Birds by Salim Ali. (1996).

During the study periodvarying from December 2023 to March 2024, Bird community in and around Sukhna Wetland, Chandigarh represented nearly 12 aquatic waterfowls and many other common avifauna. Out of the twelve species, Pintail, Mallard and Spotbill were most abundant species. The population of all the other species of birds likes Blue Rock Pigeons (Columba livia) (23.72%) Spotted Doves (Streptopelia chinensis), (7.62%) Red-wattled Lapwings (Vanellus indicus) (6.77%) House Crows (Corvus splendens), (11.01%) Common Mynas (Acridotheres tristis) (15.25%) Common Kingfisher (Alcedo atthis) (6.77%) White-breasted Kingfisher (Halcyon symrnensis) (11.86%) White Wagtails (Motacilla alba) (16.94%) also varied throughout the study period. According to Storch and Kotecky (1999), type of the habitat itself is a main factor, which influences the bird community composition and their abundance more strongly than any other factors. Fluctuations from earlier data in species number may be due to changed environmental conditions over the period of time. According to Ambuel and Temple (1983) and Ford (1987), density of vegetation cover may also affect the abundance of species in a particular area. According to Block and Morrison (1991) some species occur throughout the year whereas other species may be present only during winter migratory season or for Breeding. From the above discussion, it can be concluded that some species occur throughout the year whereas other species may be present only during winter migratory season or for Breeding.

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