AVIFAUNAL BIODIVERSITY AROUND PRATAPGUNJ CAMPUS OF THE M.S. UNIVERSITY OF BARODA AND SAYAJIBAUG: SUSTAINABILITY ISSUES, CONCERNS AND CHALLENGES

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Abstract: It has become imperative to identify biodiversity conservation hotspots within metropolitan areas to combat the increasing threats to the urban biodiversity. The main campus of The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, is rich in biodiversity having different type of flora and fauna. The Bhuki Nala weaves through the campus adding to the prolific ecosystem. Listing and highlighting the avian biodiversity around Pratapgunj Campus of The M.S. University of Baroda and Sayajibaug was carried out to analyze the avifaunal species richness of the study site. A total of 53 species of bird belonging to 31 families of 14 orders of class of Aves were observed. Alexandrine Parakeet is said to be near threatened by IUCN, all other species observed are said to be least concerned. Rosy Starling, White Wagtails are among the migratory species spotted here. It is observed that, although the study area has rich avian diversity, their existing important habitat is deteriorating in capacity and quality. It is a must to revitalize and support the existing ecosystem and also use sensitive techniques to improve and increase biodiversity in and around the main campus of The Maharaja Sayajirao University of Baroda.

Keywords: Avifaunal Biodiversity, Urban Ecosystem, Sustainability.

Introduction: Biodiversity is defined in the India's Biological Diversity Act (2002) [1] as "the variability among living organisms from all sources and the ecological complexes of which they are part, and includes diversity within species or between species and of eco systems".

Biodiversity of any region is important and should be conserved as humans are also an integral part of it. No ecosystem with declining biodiversity in any aspect- be it mammalian or avian or floral- can survive without being balanced. Human influenced extinction causes random changes in the food chain, which affects several species' population. Human population tends to exploit any natural resource till the point of endangerment and then on realization, puts in extra efforts to conserve it. Instead if, awareness is increased and judicial use is practiced with minimal possible influence to the ecosystem, then, before it is too late, the natural balance can be restored by adopting sustainability practices.

According to Quadros *et al.* (2009) [2], "Institution campuses that shelter native biodiversity within mega-cities are essentially ecological islands. Sustainable management of these ecological islands is the greatest challenge that is currently faced by biodiversity conservation initiatives". At the Gujarat University campus, Ahmedabad, Jain *et al.* (2005) [3] observed a total of 85 species of birds belonging to 40 families. They observed that occurrence of avifauna varied significantly according to the vegetation pattern. They opined that, "The study site is rich in avifauna but problems have arisen recently as the habitat of these birds are threatened, due to unplanned activities being carried out in favour of human development, for which the thickets of the area have been cleared". They suggest better management of such rare green spots to attract more birds as they are sensitive to local landscape and change in vegetation pattern.

Joshi (2013) [4] opined that despite being located in the heart of the city, the sprawling campus of Brihan Maharashtra College of Commerce (BMCC), Pune, supports rich flora and fauna. The campus was found to have 116 varieties of plants and trees, 54 types of birds and 22 kinds of butterflies. Further, Dey *et al.* (2013)[5] studied the avifaunal species diversity of Maharaja Bir Bikram College campus in Tripura, North East India, which has rich variety of flora and fauna. A total of 76 species of birds belonging to 42 families and 14 orders were recorded. They suggest that the distribution and occurrence of avifauna correlate well with the vegetations patterns of the area. Most of the observed species were breeding residents mainly due to occurrence of various types of microhabitats within the campus. This showed that mosaic of habitats comprising of diversified vegetations as well as water bodies are essential for conservation of birds.

Sidra *et al.* (2013) [6] stated that birds are excellent bio-indicators of the effects of urbanization since they are highly diverse and conspicuous elements of the ecosystem. At the New campus of Punjab University, Pakistan, the study was aimed to observe bird species diversity and abundance to study the possible impact of land use change on them. 76 species of birds were observed. They opined that, land use change will cause many species to migrate from the area due to loss of habitat. Thus landscape

management should be integrated into urban planning tools to ensure the maintenance of biodiversity within urbanized area.

The M.S. University campus is also one such ecological island. This paper is focused on listing and highlighting the avian biodiversity around Pratapgunj Campus of The M. S. University of Baroda and Sayajibaug to analyze the species richness of this important area of the city and its related sustainability issues. The Maharaja Sayajirao University of Baroda campus, at Vadodara, Gujarat, India (here on MSU Baroda) is an old traditional campus of heritage buildings with modern buildings added to it. In the neighboring Pratapgunj area, old bungalows with gardens are being changed to multi-storied apartment buildings that have resulted in the decrease of natural vegetation and green cover. The present paper highlights the diverse avian species that live and yet go unnoticed and are not given care and importance they deserve. It is very important for responsible citizens of any city to be aware of the diverse life forms that habit the area and respect their space and responsibly utilize nature and its provisions.

Study Area: MSU Baroda is situated in the city of Vadodara in Gujarat state, India. The area of study (22°18'32.7"N 73°11'18.6"E to 22°19'06.0"N 73°11'14.7"E and 22°18'54.5"N 73°10'55.2"E to 22°18'51.3"N 73°11'33.0"E) includes the University main campus, Pratapgunj and Sayajibaug (Fig.1.)

The Vishwamitri River and its tributaries (Bhuki nala) weave through the study area providing a water source, though highly polluted, and the area being fairly covered with vegetation serves as an attractive breeding and nesting ground for various avian species. Natural contours of the river are important for the survival of the birds,

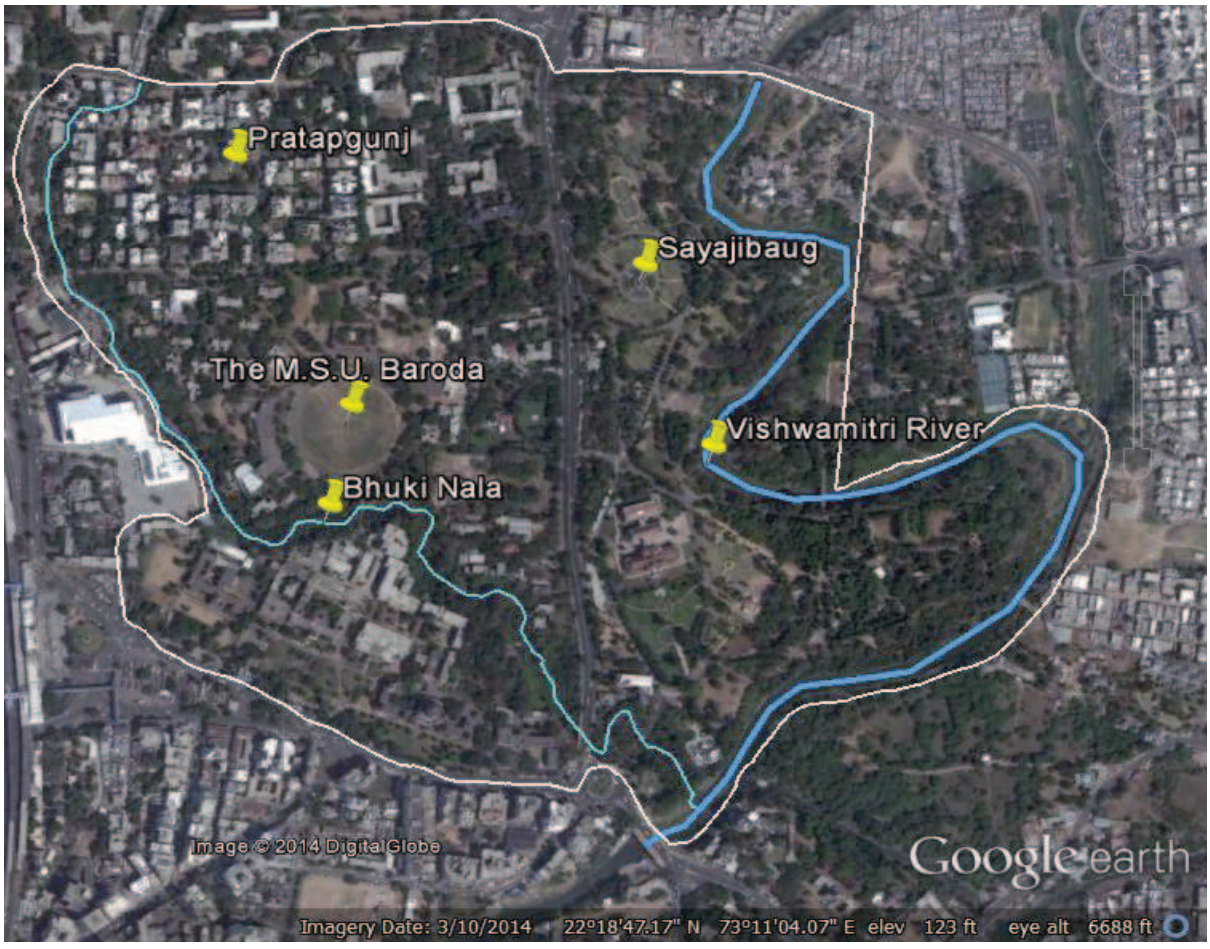

Fig. 1 Map of study area.

as it is a natural habitat providing water and food source. Vishwamitri River is an ecosystem in itself having a large population of Marsh Crocodiles and Flap shelled turtles.

The area experiences wide ranges of temperature, which ranges from an average of 40.1° C in summer to 12.5°C in winter. In this region the summers are hot and humid followed by monsoons, and the winters that are pleasant and dry.

Methodology: The survey of bird population was

made by random sampling and point count method and frequent visit to all the sites of area of study during June 2013 to July 2014.

Bird observation was carried out with the help of field binocular (8X40), during morning and evening hours viz. 06:00 to 10:00 am and 16:00 to 19:00 pm, respectively. The photography was done by Panasonic 16 megapixels digital camera.

Whole day observations were also carried out on some days. Identification of different bird species was carried out by noting down the various characteristics and with the help of photographs. The identification is based on Kazmierczak (2009) [7].

Results and Discussion: During present study, a total of 53 different species of birds were observed which can be categorized into

31 different families (Fig.2.) falling into 14 different orders (Fig.3.) of class Aves. With in India about 1225 species of birds are recorded. Of these Gujarat Biodiversity Board reports 479 species while Parasharya *et al.* (2004) [8] list 526 species of birds.

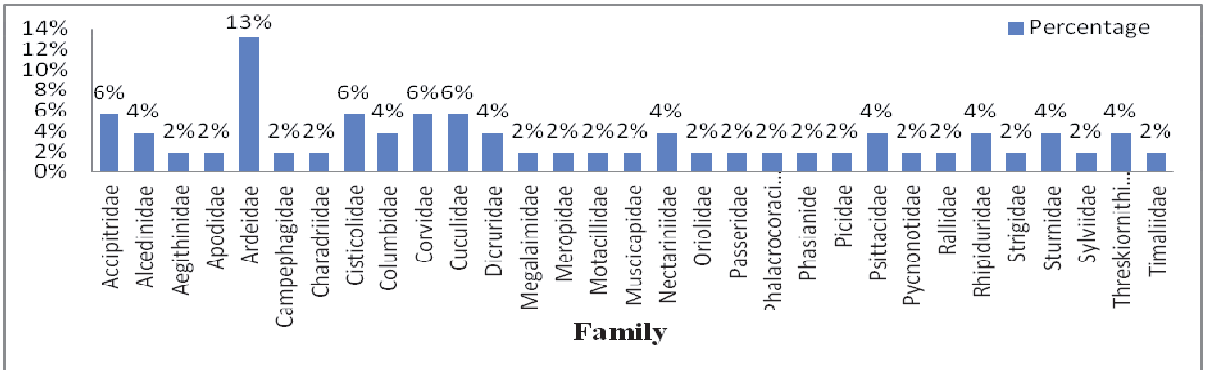

Fig. 2. Percentage of birds as per family.

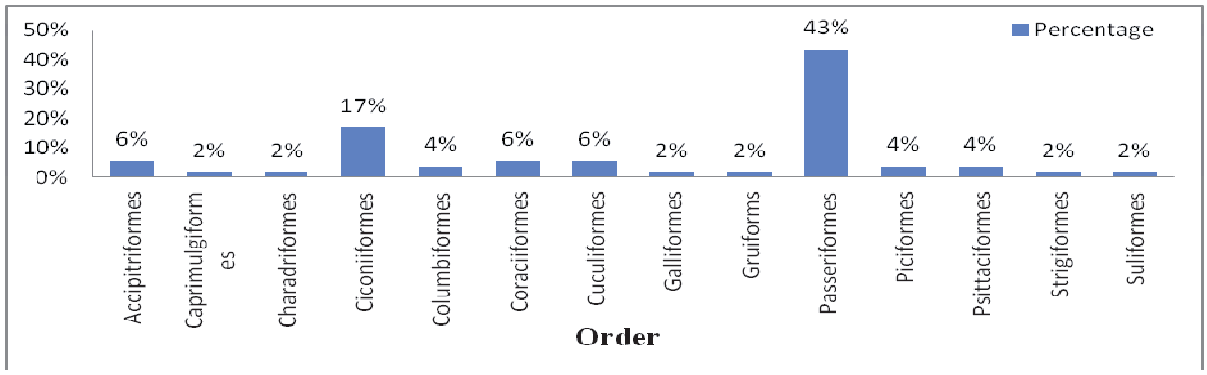

Fig. 3. Percentage of birds belonging to various orders.

It was observed that out of 53 species, 14 are carnivorous, 2 are granivorous, 2 are frugivorous, 18 are insectivorous, 2 are nectarivorous and 15 are omnivorous (Fig.4).

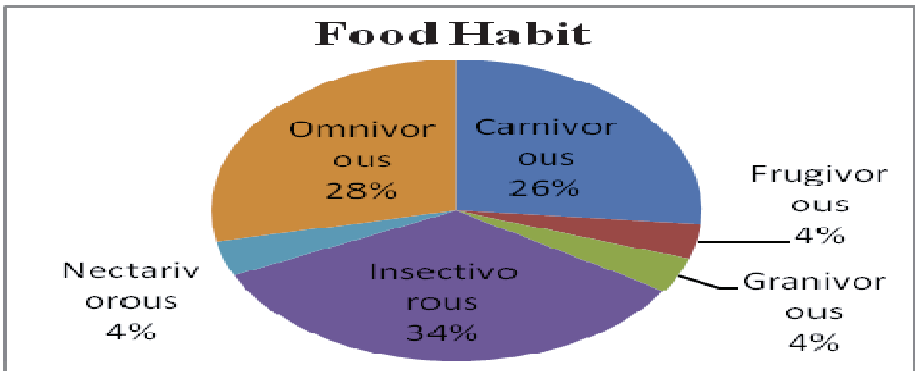

Fig. 4. Percentage of birds according to food habits.

Arboreal insectivores are maximum amongst the aerial, arboreal and ground insectivores observed (Fig.5).

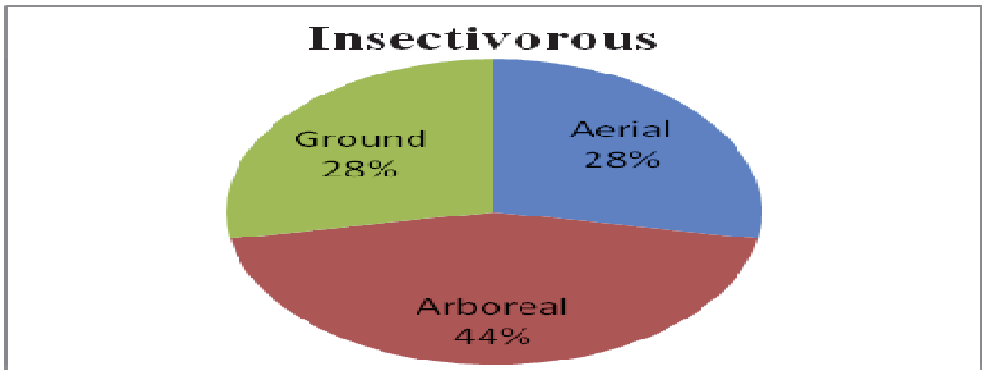

Fig. 5 Percentage of birds as per insecti-vorous guilds.

The list of species of birds recorded in the area is given in Table.1. Though only 2 migratory species White Wagtail and Rosy Starlings are recorded, they occur in good numbers.

A fairly large heronry is present in Sayajibaug alongside the Vishwamitri river bank. Red Wattled Lapwings can be observed nesting in the University cricket ground close to Bhuki nala. In addition Ashy Prinia, Common Myna, Common Tailorbird, Greater Flameback, House Crow, House Swift, Jungle Babbler, Plain Prinia, Purple Sunbird, Purple-Rumped Sunbird, Red-Vented Bulbul, Rock Pigeon, Rose-Ringed Parakeet, Rufous Treepie, Rufous-fronted Prinia, Spotted Dove, Spotted Owlet, etc also nest in the area. These observations suggest that the area provides a favorable habitat for the bird's to feed and nest.

A lot of human interference, construction activities, noise of vehicles, increasing air and water pollution levels may pose a threat to avifauna. This might be the reason why species diversity was not high. One important observation is, as bungalows of Pratapgunj are replaced by apartment blocks and the number of trees and bushes of MSU Baroda campus are replaced by new buildings, human disturbance has increased and the house sparrow population of the region has declined sharply. House sparrows are now seen on the outskirts of the city where they still can find small corners in roofs of houses to nest and have access to bushes which help protect them from predators. The decrease of sparrow population may have affected other species population also.

Rose-ringed Parakeets and Rock Pigeons have adapted to the human settlement. Rock Pigeons mostly use concrete buildings to nest in. Purple-Rumped sunbirds have started adapting to increasing human settlement. They have now started successfully nesting on clotheslines in the balconies of apartments which protect them from large predators.

According to the second author 125 species of birds have been observed over 30 years in the same area, however she has also observed that many species are not seen in recent times.

Sustainability Issues, Concerns and Challenges: MSU Baroda was planned with a diverse species of trees planted at strategic locations along with the local vegetation. The campus used to support diverse wildlife like snakes, monitor lizards, foxes, hares and several others. The Sayajibaug area around Vishwamitri supports a large heronry.

Constructions and encroachment on the Bhukhi nala flowing through the MSU Baroda campus along with rampant cutting of trees in the campus or clearing out of green patches for fast paced development has cost the birds their nesting sites. Thus the number of species and their population inhabiting the campus of MSU Baroda has significantly reduced in the last decade. According to a Times of India report (2014, Nov 14), "MSU officials said that the developer at Jay Baug premises located between two heritage buildings, with MSU's Faculty of Fine Arts on one side and Vice-chancellor's official residence Dhanvantri on the other side has not just damaged biodiversity at the premises by cutting trees but also violated bye-laws by not leaving nine-meter margin on the stretch adjacent to 'Bhu-khi Nullah'-Vishwamitri's tributary". Hence it is observed that, existing important habitat is deteriorating in capacity and quality. It is important to revitalize and support the existing ecosystem and also use sensitive techniques to improve and increase the biodiversity.

"Human activity is putting such strain on the natural functions of the Earth, that the ability of the planet's ecosystems to sustain future generations can no

longer be taken for granted." says the Millennium Ecosystem Assessment, March 2005[9]. From habitat damage and modification (e.g. river front projects reducing natural rivers to canals) to our excessive use of natural resources, humans are damaging the natural systems which support life on our planet. According to the 'Millennium Ecosystem Assessment' [9], global species extinction rates are now up to 1000 times higher than the historical rate shown by the fossil record. This is expected to increase 10 fold over the next 50 years. At this alarming rate of extinction, the balance of food chain as well as natural resources will be difficult to maintain.

Conclusion: The study site is rich in avifauna but there is an increasing pressure on the habitat of these birds due to unplanned activities being carried out in favor of human development. Birds are sensitive to changes in climate as well as landscape and vegetation. Green cover in a human settlement should be maintained for species diversity. We are dependant for our provisions, wellbeing and comfort on essential biological systems and processes. As a major source of inspiration for many, MSU Baroda must break new ground by appreciating the biodiversity of the campus and practicing sustainability techniques.

MSU Baroda is blessed with a wide biodiversity and effort needs to be made to appreciate and protect it. If the wildlife is protected and helped to thrive; it will not only create a peaceful environment for study and work but the university will also be acclaimed and accredited for its efforts. MSU Baroda with large tracks of land at its disposal must create a master plan for construction / expansion of buildings. Pratapgunj, a private residential pocket within the MSU Baroda campus also has a significant number of trees in its vicinity; a stronger relationship of the residents with the University will also help develop the neighborhood as a greener area that is in sync with nature.

If all stake holders in the area of study come together for such a noble purpose, they can come up with an efficient biodiversity action plan which is scientifically correct as well as economically feasible.

There are a large number of students and researches in the campus. If their help is enlisted it will be an exciting task to document the existing biodiversity as well a spread awareness to improve, and protect the habitat to create a wonderful biodiversity hotspot.

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Table 1.Avifaunal species recorded at the study sites of Pratapgunj campus of The M.S. University of Baroda and Sayajibaug

Sr.No	Common Name	Scientific Name	R/M	Conservation Status (IUCN)
1	Alexandrine Parakeet	*Psittacula eupatria*	R	Near Threatened
2	Ashy Drongo	*Dicrurus leucophaeus*	RM	Least Concerned
3	Ashy Prinia	*Prinia socialis*	R	Least Concerned
4	Asian Koel	*Eudynamys scolopacea*	R	Least Concerned
5	Black Drongo	*Dicrurus macrocercus*	R	Least Concerned
6	Black Ibis	*Pseudibis papillosa*	R	Least Concerned
7	Black Kite	*Milvus migrans*	R	Least Concerned
8	Black-crowned Night Heron	*Nycticorax nycticorax*	R	Least Concerned
9	Black-headed Cuckooshrike	*Coracina melanoptera*	R	Least Concerned
10	Black-headed Ibis	*Threskiornis melanocephalus*	RM	Least Concerned
11	Cattle Egret	*Bubulcus ibis*	R	Least Concerned
12	Common Iora	*Aegithina tiphia*	R	Least Concerned
13	Common Kingfisher	*Alcedo atthis*	R	Least Concerned
14	Common Myna	*Acridotheres tristis*	R	Least Concerned
15	Common Tailorbird	*Orthotomus sutorius*	R	Least Concerned
16	Coppersmith Barbet	*Megalaima haemacephala*	R	Least Concerned
17	Drongo Cuckoo	*Surniculus lugubris*	M	Least Concerned
18	Eurasian Golden Oriole	*Oriolus oriolus*	RM	Least Concerned
19	Great Egret	*Casmerodius albus*	R	Least Concerned
20	Greater Coucal	*Centropus sinensis*	R	Least Concerned
21	Greater Flameback	*Chrysocolaptes lucidus*	R	Least Concerned
22	Green Bee-eater	*Merops orientalis*	R	Least Concerned
23	Grey Heron	*Ardea cinerea*	R	Least Concerned
24	House Crow	*Corvus splendens*	R	Least Concerned
25	House Sparrow	*Passer domesticus*	R	Least Concerned
26	House Swift	*Apus affinis*	R	Least Concerned
27	Indian Peafowl	*Pavo cristatus*	R	Least Concerned
28	Indian Pond Heron	*Ardeola grayii*	R	Least Concerned
29	Intermediate Egret	*Mesophoyx intermedia*	R	Least Concerned
30	Jungle Babbler	*Turdoides striatus*	R	Least Concerned
31	Large billed crow	*Corvus macrorhynchos*	R	Least Concerned
32	Little Cormorant	*Phalacrocorax niger*	R	Least Concerned
33	Little Egret	*Egretta garzetta*	R	Least Concerned
34	Oriental Honey-buzzard	*Pernis ptilorhynchus*	R	Least Concerned
35	Oriental Magpie Robin	*Copsychus saularis*	R	Least Concerned
36	Plain Prinia	*Prinia inornata*	R	Least Concerned
37	Purple Sunbird	*Nectarinia asiatica*	R	Least Concerned
38	Purple-rumped sunbird	*Nectarinia zeylonica*	R	Least Concerned
39	Red-wattled Lapwing	*Vanellus indicus*	R	Least Concerned
40	Red-wented Bulbul	*Pycnonotus cafer*	R	Least Concerned
41	Rock Pigeon	*Columba livia*	R	Least Concerned
42	Rose-ringed Parakeet	*Psittacula krameri*	R	Least Concerned
43	Rosy Starling	*Sturnus roseus*	M	Least Concerned
44	Rufous Treepie	*Dendrocitta vagabunda*	R	Least Concerned
45	Rufous-fronted Prinia	*Prinia buchanani*	R	Least Concerned

46	Shikra	*Accipiter badius*	R	Least Concerned
47	Spotted Dove	*Streptopelia chinensis*	R	Least Concerned
48	Spotted Owlet	*Athene brama*	R	Least Concerned
49	White Wagtail	*Motacilla alba*	M	Least Concerned
50	White-breasted Waterhen	*Amaurornis phoenicurus*	R	Least Concerned
51	White-browed Fantail	*Rhipidura aureola*	R	Least Concerned
52	White-throated Fantail	*Rhipidura albicollis*	R	Least Concerned
53	White-throated Kingfisher	*Halcyon smyrnensis*	R	Least Concerned
R- Resident, M- Migratory , RM – Residential Migratory				

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