

A Short-Term Survey of Avian and Mammalian Diversity of Matheran: A Tourist Hub

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Abstract: Matheran is not only a cultural legacy or a tourist spot but also a great natural resource with immense intrinsic value that can contribute significantly to the ecological patterns of the area. Former said, it being a tourist spot, has repercussions of its own, where like every other hill station it has succumbed to waves of tourists and unplanned development leading to loss of its pristine. While Matheran and nearby areas are growing in its infrastructure, several sites in the region still harbor rich biodiversity. This study aims to assess the avian and mammalian diversity in the vicinity of the tourist spots in order to assess their conservation importance. The results from the study were as follows. Mean population of the two locations are 291 and 133. Few location points appeared to have more abundance yet showed dominance of few opportunistic species. Few rare species were also sighted in spots having minimum human interference. This shows that even though Matheran is a popular tourist destination, the prohibition of vehicular entry in Matheran has been a boon for the biological diversity conservation in that area.

Index Terms: Abundance, biodiversity, conservation, ecological, opportunistic.

I. INTRODUCTION

Tourism is considered a leisure activity that the majority of people indulge into, so as to break the tedium of life (Bhatia, 2013). It has a potential to develop at a high rate and guarantee consequential improvement in the infrastructure (Vethirajan & Nagavalli, 2014). India possesses one of the enormously growing tourism industries (Arunmozhi & Panneerselvam, 2013), that aids in improving economic condition (Nag, 2013). India has seen a consistent development in its travel industry in the past few years with an increased footfall rate of 16.3 per annum (Subash, 2015). Wildlife tourism has also shown rapid growth, alluring local and foreign visitors, thereby generating

avenues (Aftabuddin & Jain, 2017).

Apart from creating new jobs and developing the economy, tourism has a few downsides, such as, destruction of landscapes and communities, contamination of air and water, undervaluation of cultures along with several others. It has prompted the destruction of coastlines, deforestation of alpine zones, disintegration of valuable landscapes, and annihilation of wildlife habitats (Croall, 1995). It is viewed as an endogenous movement and displayed as a component of costs and ecological damage (Alavalapati & Adamowicz, 2000). Several studies have indicated the stress response of wildlife in terms of demographic, physiological and behavioral changes, to anthropogeny (Martin & Réala, 2007).

Avifaunal diversity forms an important component of the natural ecosystem that serves as an indicator of disturbance. Population of birds are sensitive to pollution in both terrestrial and aquatic ecosystems (Manjunath and Joshi, 2012). They respond positively or negatively to the kind and intensity of anthropogenic activities. While some species are lost due to changes in the habitat matrix, several opportunistic species flourish even in dense urban jungles. Likewise, many bird species are known to inhabit the urban Mumbai metropolis (Monga, 2004) and its surrounding areas including Mahul (Verma et al., 2003), Uran (Pawar, 2011), Vasai (Walmiki et al., 2013), and Thane Creek (Nitsure, 2002; Quadros, 2001). However, there is a lack of thorough survey on the bird diversity of some of the tourism hotspots in and around the city. These areas in the outskirts of the city are known to be few of the last remaining wild spaces around the city that act as carbon sink, but are experiencing habitat loss and degradation at a rapid rate (Khan et al. 2016, Sinnarkar et al. 2013). Hence, it becomes imperative to assess the level of degradation in these areas by determining how different indicator species inhabiting the areas respond to alterations in their natural habitat.

Matheran which happens to be one such area around Mumbai is a tourism hotspot that is known for its wilderness. Understanding, monitoring and documenting biodiversity, distribution and density would help delineate the importance of regional and local landscapes as well as habitat conservation.

II. METHODOLOGY

A. Study Sites

Matheran is a small town in western Maharashtra, just 18 miles from the borders of Mumbai municipal area. It is situated in the Sahyadri range of the Western Ghats in India that is recognized as a unique biogeographic province (Mani 1974), a global biodiversity hotspot (Myers et al. 2000), and as one of the 200 most important eco-regions of the world (Olson & Dinerstein 1998). The region is known for its pristine beautiful thick forests and a few small natural reserves. Matheran is considered to be one of the eco-zones of the state, where automobiles/buses are not allowed, with horses and bikes being the only permissible means of transportation.

The study was conducted in two patches- Simson Tank (ST) and Aman Lodge (AL), encompassing 8 points, with varying human interference level. (Table I.)

Table I. Level of human interference at the following points

Location Points	Human Interference
ST 1	Maximum
ST 2	Moderate
ST 3	Minimum
ST 4	Minimum
ST 5	Minimum
AL 1	Minimum
AL 2	Moderate
AL 3	Maximum

SIMSON TANK, an open area with a small man-made water body surrounding dry woods and evergreen trees.

AMAN LODGE, area covered by dense evergreen trees. The trees form a cover over a variety of shade loving herbs, climbers, ferns and mosses. Laterite porous soil with heavy rainfall augmented in unique floral diversity.

B. Materials and Methods

For the study, a point-count method was employed in each of the 8 points in the two patches. The identity and abundances of the birds and the mammals were recorded. Survey was conducted twice a week from December 2019 to February 2020 on weekends and weekdays between 0700 hours to 0900 hours. All birds (sitting, perching, swimming, foraging and flying) were recorded and identified in their natural habitat. Olympus (10*50x) binoculars for close observation of the birds were used. CANON 7D Mark II – 400mm lens prime lens was used for photographing. “Birds of Indian Subcontinent (Grimmett & Inskipp, 2011) was used for species identification.

C. Analysis

All the data cleaning, analysis and visualizations were done

using Microsoft Excel, 2010 and AI Young Biodiversity Calculator.

III. RESULTS AND DISCUSSION

A. Result

Total number of birds and mammals observed at two spots were 1685, out of which 1318 were birds (Table II.) and 367 were mammals (Table III). At Simson Tank the total number of organisms seen were 1367, out of which 1051 birds and 316 were mammals and at Aman Lodge the total count was 318, out of which 267 were birds and 51 were mammals.

Table II. Checklist of birds along with scientific name, IUCN status and count.

Sr. No.	Name	Scientific Name	IUCN Status	Count
1	Ashy Drongo	<i>Dicrurus leucophaeus</i>	LC	58
2	Asian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	LC	151
3	Black Drongo	<i>Dicrurus macrocercus</i>	LC	259
4	Black Redstart	<i>Phoenicurus ochruros</i>	LC	14
5	Black-Naped Monarch	<i>Hypothymis azurea</i>	LC	5
6	Blue-Capped Rock Thrush	<i>Monticola cinclorhynchus</i>	LC	3
7	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	LC	14
8	Brahminy Kite	<i>Haliastur indus</i>	LC	1
9	Brown Headed Barbet	<i>Megalaima zeylanica</i>	LC	14
10	Brown Wood Owl	<i>Strix leptogrammica</i>	LC	3
11	Cattle Egret	<i>Bubulcus ibis</i>	LC	2
12	Citrine Wagtail	<i>Motacilla citreola</i>	LC	3
13	Common Iora	<i>Aegithina tiphia</i>	LC	6
14	Common Tailorbird	<i>Orthotomus sutorius</i>	LC	6
15	Coppersmith Barbet	<i>Megalaima haemacephala</i>	LC	7
16	Crimson-Backed Sunbird	<i>Leptocoma minima</i>	LC	61
17	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	LC	5
18	Forest Wagtail	<i>Dendronanthus indicus</i>	LC	1
19	Greater Racket-	<i>Dicrurus paradiseus</i>	LC	5

	Tailed Drogo			
20	Green Bee-Eater	<i>Merops orientalis</i>	LC	20
21	Greenish Warbler	<i>Phylloscopus trochiloides</i>	LC	8
22	Grey Wagtail	<i>Motacilla cinerea</i>	LC	112
23	Grey Warbler	<i>Gerygone igata</i>	LC	2
24	Indian Blackbird	<i>Turdus simillimus</i>	LC	3
25	Indian Blue Robin	<i>Luscinia brunnea</i>	LC	6
26	Indian Golden Oriole	<i>Oriolus kundoo</i>	LC	4
27	Jungle Babbler	<i>Turdoides striata</i>	LC	5
28	Laughing Dove	<i>Spilopelia senegalensis</i>	LC	1
29	Malabar Whistling Thrush	<i>Myophonus horsfieldii</i>	LC	9
30	Nilgiri Wood Pigeon	<i>Columba elphinstonii</i>	V	1
31	Oriental Magpie-Robin	<i>Copsychus saularis</i>	LC	4
32	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	LC	3
33	Oriental White Eye	<i>Zosterops palpebrosus</i>	LC	15
34	Purple-Rumped Sunbird	<i>Leptocoma zeylonica</i>	LC	44
35	Red-Breasted Flycatcher	<i>Ficedula parva</i>	LC	32
36	Red-Vented Bulbul	<i>Pycnonotus cafer</i>	LC	3
37	Red-Whiskered Bulbul	<i>Pycnonotus jocosus</i>	LC	220
38	Scaly-Breasted Munia	<i>Lonchura punctulata</i>	LC	4
39	Spotted Dove	<i>Spilopelia chinensis</i>	LC	7
40	Sulphur-Bellied Warbler	<i>Phylloscopus griseolus</i>	LC	49
41	Tickle's Blue Flycatcher	<i>Cyornis tickelliae</i>	LC	20
42	Tree Pipit	<i>Anthus trivialis</i>	LC	12
43	Ultramarine Flycatcher	<i>Ficedula superciliaris</i>	LC	1
44	Verditer Flycatcher	<i>Eumyias thalassinus</i>	LC	57

45	White-Bellied Drongo	<i>Dicrurus caerulescens</i>	LC	13
46	White-Browed Bulbul	<i>Pycnonotus luteolus</i>	LC	2
47	White-Eared Bulbul	<i>Pycnonotus lucotis</i>	LC	1
48	White-Rumped Shama	<i>Copsychus malabaricus</i>	LC	37
49	White-Throated Kingfisher	<i>Halcyon smyrnensis</i>	LC	5
	Total=49			1318

Table III. Checklist of mammals along with scientific name, IUCN status and count.

Sr. No.	Name	Scientific Name	IUCN Status	Count
1	Bonnet Macaque	<i>Macaca radiata</i>	V	61
2	Malabar Giant Squirrel	<i>Ratufa indica</i>	LC	127
3	Malabar Treeshrew	<i>Anathana ellioti</i>	LC	1
4	Three-Striped Palm Squirrel	<i>Funambulus palmarum</i>	LC	178
	Total=4			367

The average population at Simson Tank is 291 with standard deviation of 69.5 and that of Aman Lodge is 133 with standard deviation of 43.1 (Fig. 1).

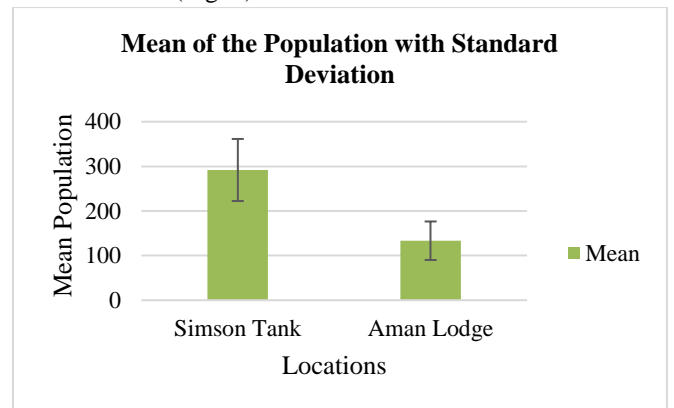


Fig. 1. Mean and standard deviation of population of Simson Tank and Aman Lodge

The species richness of ST1 is the maximum and that of AL3 is the minimum (Fig. 2).

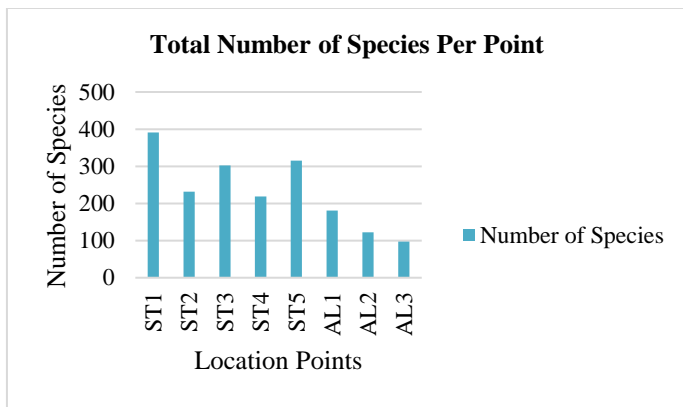


Fig. 2. Species richness of all the points of study

The Simpson's Diversity (Simpson, 1949) for Mammals across the two sites was found to be 0.619 that indicates moderately high diversity in mammals. The Simpson's Diversity for Birds obtained was 0.903 which indicates high diversity in birds (Fig. 3, Fig 4).

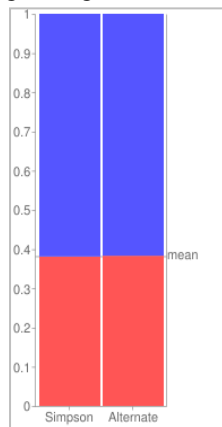


Fig. 3. Comparison of means of Simpson and alternate reciprocal Simpson indices of mammals

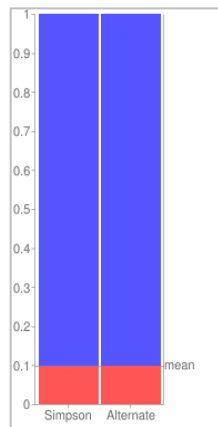


Fig. 4. Comparison of means of Simpson and alternate reciprocal Simpson indices in birds.

The Shannon-Wiener's Index (Shannon & Wiener, 1949) of each site was calculated and their comparison suggests that the points ST1 and ST5, although abundant in the number of species, found are dominated by a few species, thus meaning that they are least evenly distributed. Whereas, the points AL2 and AL3 have higher values suggesting that they are more evenly distributed and includes equivalent number of each species (Fig. 5).

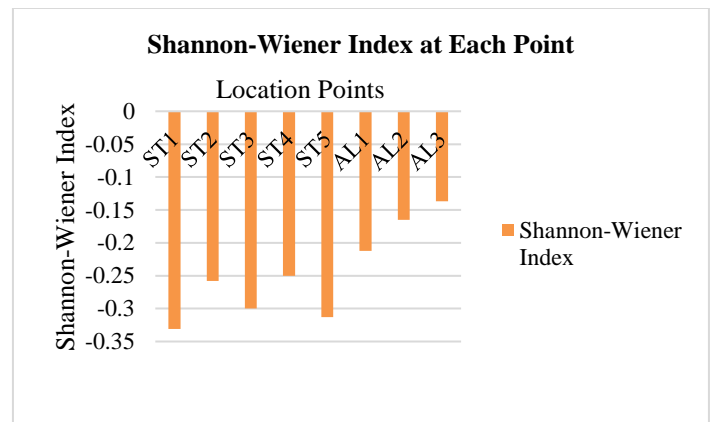


Fig. 5. Shannon-Wiener Index showing comparison between all the points of study.

This suggests that the birds were more evenly distributed in all the points than mammals. Mammals were dominated by Bonnet Macaques (Fig. 6).

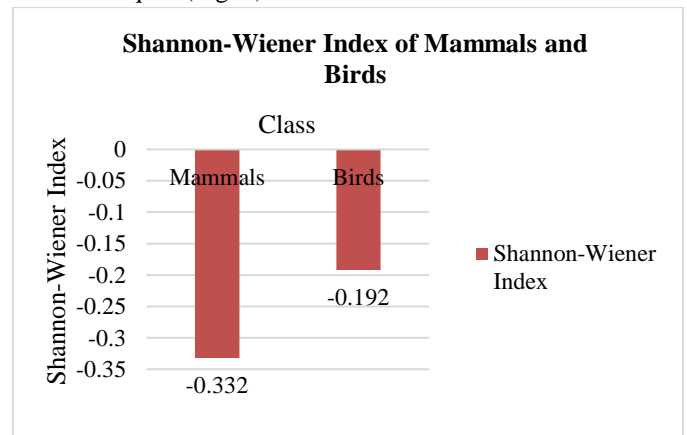


Fig. 6. Shannon-Wiener Index showing comparison between all the mammals and birds.

B. Discussion

A total of 49 species of birds and 4 species of mammals were recorded in the two sites Simson Tank and Aman Lodge, Matheran. The sites were dominated by Black Drongo (N=259) followed by Red Whiskered Bulbul (N=220) and Three Striped Squirrel (N=178). The highly disturbed tourist spot had higher abundances of human associated urban exploiter species and, to a certain extent, edge species than the other areas (Huhta & Sulkava, 2014). Bonnet Macaques were most observed at points where the human activities were maximum. Most of the species found have coexistence with the human population and their numbers were high near human disturbance to obtain easy food. The rare species like Ultramarine Flycatcher (N=1) and Nilgiri Wood Pigeon (N=1) were observed at sites with least human activities. This also indicates that prohibition on vehicular entrance resulted in flourishing of rare and forested species located in the interior regions. Matheran is in close proximity with the ever-crowded Mumbai metropolitan city and many tourists find solace at this hill station. The decision of the gram

panchayat to not allow vehicular traffic and non-existence of roads for the same has been a good decision for many centuries. The local population showing cooperation for the same to preserve the highly dense forest and earn livelihood has been a positive point for Matheran. This study provides a baseline data for a long-term survey which would enhance the biodiversity of this hill station.

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