DISTRIBUTION, BEHAVIOR AND NESTING HABITAT OF LARGE AND SMALL OWLS IN CHOURAKUND RANGE, MELGHAT TIGER RESERVE

Submitted by:

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SUPPORTED BY:

Ministry of Environment, Forest & Climate Change

WRCS

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DISTRIBUTION, BEHAVIOR AND NESTING HABITAT OF LARGE AND SMALL OWLS IN CHOURAKUND RANGE, MELGHAT TIGER RESERVE

Major Project Dissertation

Submitted by

MAHASWETA PATNAIK

For the partial fulfillment of the

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Project Details

Title of the Thesis	**Distribution, Behavior and Nesting Habitat of Large and Small Owls in Chourakund Range, Melghat Forests, Amravati District, Maharashtra**
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DECLARATION

This is to certify that the work that forms the basis of this project "DISTRIBUTION, BEHAVIOR AND NESTING HABITAT OF LARGE AND SMALL OWLS IN CHAURAKUND RANGE, MELGHAT FORESTS, AMRAVATI DISTRICT, MAHARASHTRA" is an original work carried out by me and has not been submitted anywhere else for the award of any degree.

I certify that all sources of information and data are fully acknowledged in the project Dissertation.

MAHASWETA PATNAIK

Date: 13th June 2018

CERTIFICATE

This is to certify that Mahasweta Patnaik has carried out her major project in partial fulfillment of the requirement for the **Degree of Master of Science** in Environmental Studies and Resource Management on the topic "Distribution, Behavior and Nesting Habitat of Large and Small Owls in Chourakund Range, Melghat Forests, Amravati District, Maharashtra" during December 2017 to May 2018. The project was supported by the Wildlife Research and Conservation Society, Pune.

The Dissertation embodies the original work of the candidate to the best of our knowledge

Date: 11/06/2018

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Mahasweta Patnaik

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List of Abbreviations

BFO	Brown Fish Owl
BO	Barn Owl
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
FO	Forest Owlet
IEO	Indian Eagle Owl
IUCN	International Union of Conservation Nature
JO	Jungle Owlet
MTR	Melghat Tiger Reserve
MWO	Mottled Wood Owl
RRCF	Raptor Research and Conservation Foundation
SCO	Indian Scops Owl
SPO	Spotted Owlet
TERI	The Energy and Resource Institute
WRCS	Wildlife Research and Conservation Society

Abstract

The Melghat Tiger Reserve is located in Satpura Hill Ranges of Central India. The Melghat forest is well known for its rich biodiversity providing a safe haven for various plants and animals. The forest type found here is Dry Deciduous Teak dominant. My work consisted of studying the distribution, behavior and nesting habitats of large and small owls in the study area. My study area was Chaurakund range in Sipna Division of the Tiger Reserve. I examined the distribution of eight owl species namely Indian Eagle Owl, Brown Fish Owl, Mottled Wood Owl, Barn Owl, Indian Scops Owl, Forest owlet, Spotted Owlet and Jungle Owlet in the study area through route surveys. I could observe 2 nests of each owl species during the study period. I have been able to spend 312 hours on studying the behavior of each owl species in the area. Based on my study, it appears that he Forest Owlet and Jungle Owlet are widely distributed in the area. It was also observed that some species were found to be sharing a close ecological niche but every species has its unique requirements to inhabit a location. The study enabled us to understand the activities of all the Owl species and also gave us an insight on how these owl species coexist and interact with other bird species. This study is a preliminary effort to understand the coexistence of eight owl species found in the area and also provides us a future direction to study the ecological niche they share as well as the sympatric behavior.

Key words: Melghat Tiger Reserve, Chaurakund Range, Owl Distribution, Nesting Habitat, Owl Behavior.

Chapter 1

Introduction

Owls are successful raptors with unique adaptations. They are mainly nocturnal birds with a few exceptions. They are monogamous, and there is little sexual dimorphism. Their plumage is usually soft and fluffy allowing for silent flight and also generally cryptic so as to prey on unsuspecting prey. They have powerful talons and binocular vision assisting them to become successful predators (Grimmett et al. 2014).

Owls are found in different kinds of habitats, ranging from deserts to open forests, dense forests, riverine areas, and near human habitations like farmlands, village outskirts etc. However, despite their ubiquity they are not easily seen. Most owl species are nocturnal and are active during dusk or in the dark generally foraging. The large eyes of owls, placed on the front of the face like those of a human, are primarily binocular to enable the bird to fix the position of their prey (Ahmed 2010). Owls can turn their heads right round to look behind. Owls are an essential component of the ecosystem. They feed on small mammals, birds, frogs, lizards and insects (Ali and Ripley 1969) and are at the apex of the food chain. Owls hunt by plunging at their prey and clutch it with their hooked talons.

Owls belong to the Order Strigiformes, which is categorized into two families:

- Family Tytonidae (Barn owls): Owls from this family have a heart-shaped disk completely encircling the face with a longer and narrower skull than typical owls. The middle toe has a serrated comb on the claw. The legs are relatively long. The clavicles are not separate and not fused to the sternum. Three species of this family are known from India (Ahmed 2010).
- Family Strigidae (Owls): Typical owls with a round facial disk. The legs are relatively short. The clavicles are fused to the sternum and there is no comb on the middle claw. These owls have an upright stance, hooked bill and sharp talons with a reversible outer toe. The eyes are forward facing and virtually fixed although the neck is highly flexible. Twenty-seven species of this family are known from India (Ahmed 2010).

Owls are specialized avian predators who feed on rodents, birds, reptiles, amphibians, annelids and arthropods (Mason & Lefroy 1912, Ali & Ripley 1969, Sridhar 1981). They provide an important ecological service as they feed on rodents who generally destroy huge quantities of crops annually (Sridhar 1981), causing economical setback to the farmers. They are natural pest controllers eradicating pest while striking a balance in the food chain.

In India, owls are associated with a wide range of myths, folklore and superstitions concerning black magic and witchcraft, prophecy, birth, death and many other natural and unnatural phenomena (Bruce 1999, Marks et al. 1999). The appearance of owls combined with their nocturnal habits and haunting calls, invokes fear and superstition among people of many different cultures (Ahmed 2010). According to Hindu mythology owls are considered to be vahana of Goddess Laxmi (Chopra 2017). But due to a superstitious belief system in India a large number of owls are been scarified in and around Delhi and Uttar Pradesh in order to attain prosperity and good luck during the Diwali season every year (Dev 2016).

All species of owls found in India are protected under the Wildlife (Protection) Act, 1972 (WPA). The 1991 amendment to the WPA bans the trade, trapping and hunting and transport of owls. The Forest Owlet is included under Critically Endangered category according to the IUCN and is an endemic species to the country. Recently the status of Forest Owlet was converted from critically endangered to endangered according to the IUCN red list. (Birdlife International 2017).

The Melghat Tiger Reserve (MTR) is one of the earliest nine Tiger Reserves established by the Government of India and is the first Tiger Reserve to be declared in the state of Maharashtra. The Tiger Reserve is located in Satpura Hill Ranges in Central India. Melghat forests are well known for its rich biodiversity including a good population of animals and birds. In a survey conducted by the Zoological Survey of India and Western Regional Station, Pune the reserve was found to have about 80 species of mammals, 262 species of Birds, 54 species of amphibians and 96 species of fishes (Melghat Tiger Project 2018).

The Melghat Tiger reserve is known to support 9 species of Owls namely the Indian Eagle Owl *Bubo bengalensis*, Brown Fish Owl *Ketupa zeylonensis,* Mottled Wood Owl *Strix ocellata,* Barn Owl *Tylo alba,* Brown hawk Owl *Ninox scutulata*, the Indian Scops Owl *Otus bakkamoena,* the Forest owlet *Heteroglanx blewitti*,

Spotted Owlet *Athene brama* and Jungle Owlet *Glaucidium radiatu*m (Prachi Mehta, pers.comm). Amongst the nine owl species, the Forest Owlet *Heteroglanx blewitti* is a small sized owl endemic to India (Birdlife International 2017). In the period from 1884 till 1997, there were no authentic reports of the Forest Owlet from the country and was considered to be extinct from India (Ripley 1952, 1976). However, the Forest Owlet was rediscovered from Maharashtra in 1997 after about 113 years (King & Rasmussen 1998). According to the work done by the organization, currently there are 12 confirmed populations of the Forest Owlet from India in the states of Maharashtra, Madhya Pradesh and Gujarat (Mehta et al. 2008, 2015, 2017).

Wildlife Research and Conservation Society (WRCS) has been carrying out a long-term study on the ecological correlates of the Endemic Forest Owlet and other co-existing owls in Melghat Tiger Reserve. As a part of the ongoing study, I worked on a preliminary study on the distribution of sympatric owl species in the Melghat Forests for my Master's thesis.

This study is a preliminary effort to understand the coexistence of owl species found in the Chaurakund range and gives us a future direction to study the ecological niche the owls share and also to study the sympatric behavior of the owls. The findings of the study will be a part of WRCS's long-term study on owl diversity in the area. The long-term goal of the study will be to examine ecology of large and small owls in Melghat and understand conservation requirement in the area.

1.1 Aims and objective of the study

The aim of this study was to understand the diversity and distribution of owls which co-exist with the Forest owlet in the Chaurakund range located in the Melghat Tiger Reserve. We established following the objectives for this study:

- Examine the distribution and diversity of large and small owls in the study area,
- Study the nesting and roosting sites of the owl species found in the study area.
- To document the behavior pattern of different owl species during and outside their breeding season in the study area.

1.2 Organization of the thesis

Chapter 1 – This Chapter provides an overall understanding of owls, explaining what they are, their classification, owls in India, regulations in India, Melghat Tiger Reserve and work of WRCS on Owls. The section finally leads to the aim and objectives of the present study.

Chapter 2 – This section describes the eight owl species observed in the area. The sections discusses briefly about the distribution of the species in the Indian subcontinent, the morphology, the preferred habitat and available work done on the species.

Chapter 3 – This section discusses the study area and the detailed methodology for all the objectives of this study.

Chapter 4 – This section explains the results observed for each objective and the analysis performed for each objective.

Chapter 5 - This section discusses the observed results to the already available literature. And indicates the future scope of the study.

Chapter 6 – The section concludes the entire study and explains the future scope of research in the field of owls.

Chapter 2

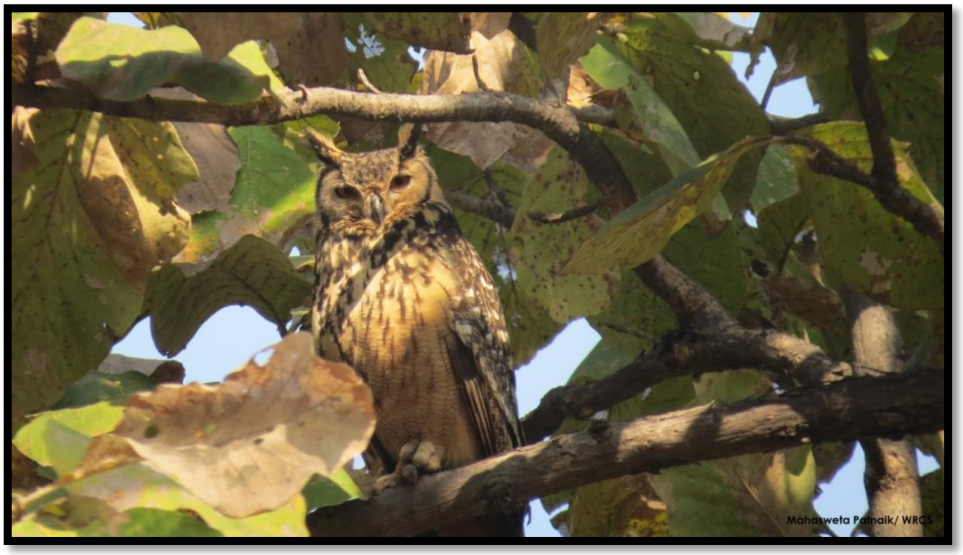
Literature Review

2.1 Indian Eagle owl

The Indian Eagle Owl or *Bubo bengalensis* is one of the largest owls found in the Indian subcontinent (Grimmett et al. 2014). The Owl has prominent brown ear-tufts, with orange-yellow to orange-red eyes. The size of the owl ranges from Length 50-56 cm. Wing length 358-433mm. Tail length 185-227mm. Females are larger than males. (Lewis 1998)

It is also known as the Rock Eagle Owl or the Bengal Eagle Owl. It's fairly distributed throughout India and is also found in Pakistan, Nepal and Burma. (Grimmett et al. 2014) The Indian Eagle Owl has a status of least concern according to the IUCN red list of threatened species (Bird Life International 2017).

The Indian Eagle Owl is a nocturnal bird that is it is active during nightfall while it is resting during the day. The Owl is found in the rocky hills with bushes, earth banks, wooded county with ravines, semi-deserts with rocks and bushes etc. The nesting sites are prevalently near agricultural lands, scrublands, and grasslands which represent important foraging patches. (Pande et al 2011). It usually hunt from a perch, they start by initially scanning the area and after they have located the prey they make low foraging flights and dive to catch the prey using their claws.



Mahasweta Patnaik/WRCS

Plate 1: Indian Eagle Owl

They primarily hunt rats and mice, but will also take birds up to the size of peafowl. They also eat reptiles, frogs, crabs and large insects. Pellets produced are generally

up to 150 x 40mm in size. (Lewis 1998) The Breeding season of these owls starts from February to April, but this may vary locally between October and May.

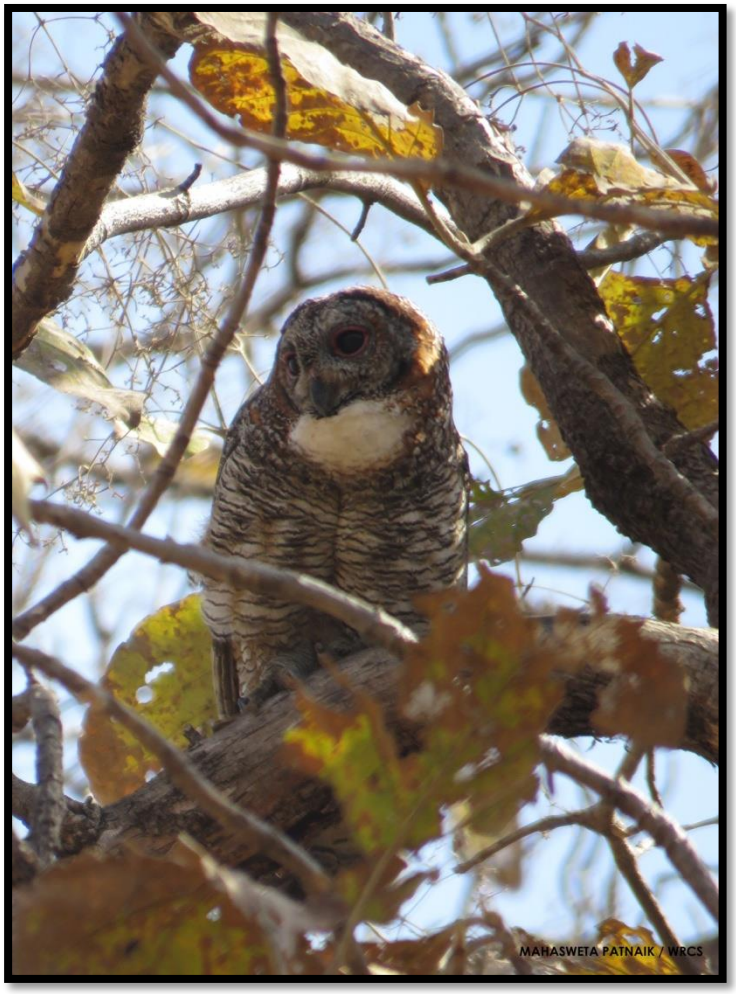
The nest is usually on a protected rock ledge, river bank, or a recess in a cliff that is in a ravine. They have also been known to nest on the ground under a bush, or between rocks on a slope. The clutch size ranges from 1-5 eggs, averaging 53.6 x 43.8mm (Pande et al 2011). The Indian Eagle Owl is one of the owl species which is part of the illegal trafficing chain in India. Younglings are been abducted from breeding nest and sold. Studies explaining the breeding biology and Chick development have been performed (Ramanujam & T. Murugavel 2009) providing us with information about the vulnerable stages of the Owl species which can be used to conserve the bird.

2.2 Mottled Wood Owl

Mottled Wood Owl or *Strix ocellata* is a large owl that is found in India. Its distribution ranges from the Himalayas eastward to lower Bengal and south to southern Nilgiris and Pondicherry. There have also been sightings in western Burma (Grimmett et al. 2014). Mottled Wood Owl has a rounded head with no ear-tufts. The eyes are dark brown and eyelids are dusky pink or dull coral-red color. The Mottled Wood Owl is a very well camouflaged bird and is a nocturnal bird species which roosts during the day on branches hidden among foliage, in pairs or sometimes family groups.

The owl feeds on rats, mice and other rodents, as well as birds up to the size of a domestic pigeon. Also takes lizards, crabs, beetles and large insects (Lewis 1998). Mottled Wood Owls are found in dense foliage trees, the nests are generally in natural hollows and groves of mature tree.

The breeding season is generally from February till April. Not much work has been done on this owl species. The Mottled Wood Owl has a status of least concern according to the IUCN red list of threatened species (BirdLife International 2016).



Mahasweta Patnaik/WRCS

Plate 2: Mottled Wood Owl

2.3 Brown Fish Owl

Brown Fish Owl or *Ketupazey lonensis* is a large owl found in India. The distribution is wide which ranges from Southwest Turkey, Northern Syria, Iraq and adjacent parts of Iran to Sind and Northwest Pakistan, all of India south of the Himalayas, Nepal, Sri Lanka, Assam, burma, Thailand, Vietnam, Taiwan, and Southeast China (Grimmett et al. 2014). As the name suggests Brown fish Owl are always found in vicinity of a water body as they depend on a riverine habitat. Brown Fish Owls feed mainly on fish, frogs and crabs, but will also take rodents, birds, reptiles and large beetles. The Owl starts by scanning the area from a perch overlooking water - such as a stump or rock on the edge or in the middle of a stream. They will often fly up and down, sometimes almost skimming the water. Fish are scooped up from near the surface (Lewis 1998). Breeding season is generally from November to March.

Nikhil Jambhale/WRCS

Plate 3: Brown Fish Owl

The Brown Fish Owl is semi-diurnal, roosting in large trees during the daytime and leaving well before sunset (Lewis 1998). They can often be seen in daylight, sometimes hunting, especially on cloudy days. They bathe frequently by wading into the shallows and ruffling their feathers before drying and carefully preening the plumage. Wavy pale brown to Rufus cross-bars and bold black shaft-streaks and golden yellow eyes are some of the distinct identifying features of the Owl. The Owl is in the least concern category according to the IUCN red list (BirdLife International 2016).

2.4 Common Barn Owl

Barn Owl or *Tyto alba* is a medium sized owl widely distributed in many parts of the world. As the name suggests 'Alba' means white, it's a white feathered bird with a heart shaped face and no ear tufts. It's a nocturnal bird, this species emerge at dusk or be active at dawn. Flight is noiseless, with wing beats interrupted by gliding. The Barn Owls are found close to human settlements and abundantly in open woodland, farms than in forest areas. They usually roost by day in tree hollows but have also been found in caves, wells, out-buildings or thick foliage.

Barn Owls specialize in hunting small ground mammals, and the vast majority of their food consists of small mammals, birds, reptiles, amphibians and insects. Among small mammals, *Suncus murinus* and *Rattus rattus* were predominant (Santhanakrishnan at el 2010). Due to dominance of rodents in their diet Barn Owl hold great ecological importance as they would predate on rodents and thus reduce the need for pesticides in farms (Santhanakrishnan at el 2010). Barn Owl falls in the least concern category according to the IUCN red list (BirdLife International 2016).

Nikhil Jambhale/WRCS

Plate 4: Barn Owl

2.5 Indian Scops Owl

Indian Scops Owl or *Otus bakkamoena* is a small owl which has large, conspicuous ear-tufts with dark outer margins. It is a nocturnal bird which is found in large nest cavities. During the day it perches in the nest cavity and rests. It's a shy bird which crawls in its nest cavity to hide whenever disturbed. It's fairly distributed all over the country and is also found in Pakistan, Nepal and Sri-lanka (Grimmett. et al. 2014). The Indian Scops Owl feeds mainly on insects including beetles and grasshoppers. They also occasionally feed on vertebrates such as lizards, mice and small birds. (Lewis 1998) The Indian Scops Owl has a status of least concerned according to the IUCN red list. (BirdLife International 2016).

Mahasweta Patnaik/WRCS

Plate 5: Indian Scops Owl

2.6 Forest Owlet

The Forest Owlet or *Heteroglaux blewitti* is a small sized diurnal owl. The bird was considered to be extinct (Ripley 1952, 1976) but later it was rediscovered from Maharashtra in 1997 after about 113 years (King & Rasmussen 1998). It is classed as a Schedule 1 species under India's Wildlife Protection Act (1972) and is listed on Appendix I of CITES (Birdlife International 2017). Initially it was categorized as critically endangered but recently it was reclassified as endangered by the IUCN red list (BirdLife International 2017). As per its latest distributional status, it is found in twelve confirmed locations in Maharashtra, Madhya Pradesh and Gujarat (Mehta et al. 2008, 2015, 2017a, 2017b).

Mahasweta Patnaik/WRCS

Plate 6: Forest Owlet

Forest Owlet is generally found in teak dominated forests areas which are closer to human settlements (Ishtiaq and Rahmani 2002, Jathar and Rahmani 2004, Mehta et al. 2008, 2015, 2017a, 2017b). Their breeding season is from October to February and the nest in tree cavities (Jathar and Rahmani 2004, Mehta et al. 2017b). Through WRCS's work on Forest Owlet in Madhya Pradesh and Maharashtra, considerable insights have been generated on its distribution, nesting habitat, breeding biology vocalization and diet (Mehta et al. 2017b, 2018). This information is useful to understand the ecological and conservation need of the species.

2.7 Jungle Owlet

The Jungle Owlet or *Glaucidium radiatum* is a small owlet which is widely distributed in the country. The distribution ranges from West Himachal to Bhutan and West Bengal south through peninsular India to Sri Lanka (Grimmett et al. 2014). It is reported from Assam, Arunachal, Bangladesh and Burma. The Jungle owlet has a rounded head, no ear-tufts and densely marked with narrow, pale ochre or rufus bars.

Mahasweta Patnaik/WRCS

Plate 7: Jungle Owlet

There are bars on the back, rump and upper tail-coverts that are often almost pure white. Jungle Owlets feed mostly on grasshoppers, locusts, cicadas and other large insects. They will also take molluscs, lizards, mice and small birds (Ali and Ripley 1969). Breeding season is from March to May. Jungle owlet is a diurnal owl which is most active an hour or so before dusk and a similar time before sunrise, but also moves about during the night (Ai and Ripley 1969). It's categorized as least concerned by the IUCN red list (BirdLife International 2016.)

2.8 Spotted Owlet

The Spotted owlet or *Athene brama* is a small owl with a round head, yellow eyes and prominent white eyebrows. It is also known as the Spotted Little Owl. Its morphology is very similar to a Forest Owlet but it has prominent spots all over its body. It's a nocturnal bird Roosts by day in tree hole or on a branch (Santhanakrishnan et al. 2010). It's also observed to be roosting in pairs or small groups. Spotted Owlets are generally found near human settlements on outskirts of villages and cultivation, groves with old trees, and ruins (Santhanakrishnan et al.

2010).

Mahasweta Patnaik/WRCS

Plate 8: Spotted Owlet

Northern races breed from February to April, while Southern races breed from November to March. Nests are in natural tree hollows, or in holes and cavities in human dwellings. Mainly preys upon beetles, moths and other insects. Also takes earthworms, lizards, mice and small birds. It is widely distributed throughout the Indian continent and has a status of near threatened according to the IUCN red list (BirdLife International 2017).

Chapter 3

Materials and Methodology

3.1 Study Area

Melghat is a densely-forested region located on the northern boundary of Maharashtra and shares its boundary with Burhanpur and Betul districts of Madhya Pradesh. It is located at 21°26′45″N 77°11′50″E in northern part of Amravati District of Maharashtra State in India. The Tapti River form one of the boundaries of the reserve. Melghat forms an offshoot of the Satpuda Hill Ranges. Melghat means 'meeting of the ghats', which describes the area as a large tract of unending hills and ravines scarred by jagged cliffs and steep climbs. The topography is very hilly but some parts towards the northern side are fairly plain. Owing to the vast landscape, and potential to support tiger population, Melghat was among the first nine tiger reserves notified in 1973 under the Project Tiger (Melghat Tiger Project, 2018).

Melghat Tiger Reserve has an area of 1677 km^2. Melghat forests are well known for its rich biological diversity including a good population of animals and birds. Some of the main Mammals of the area include Tiger *Panthera tigris*, Wild Dog *Cuon alpinus*, Gaur *Bos gaurus*, Sloth bear *Melursus ursinus*, Stripped Hyena *Hyaena hyaena*, Sambar *Rusa unicolor*, Barking deer *Muntiacus*, Four horned antelope *Tetracerus quadricornis*, Jungle Cat *Felis chaus*. The avifauna is represented by a good diversity of birds of prey, flycatchers, hornbills, and migratory water birds. (Mehta, 1998)

Of the reported species, five species viz. Indian White backed Vulture, Indian Long-billed Vulture, Osprey, Indian Peafowl and Forest Owlet are included under Schedule I, of Wildlife (Protection) Act, 1972. Further Green Munia (Family: Estrildidae) and Forest Owlet (Family: Strigidae) are endemics to Central India and are also recorded from Melghat Tiger Reserver. (Ishtiaq and Rahmani 2000)

The reserve is a catchment area for five major rivers: the Khandu, Khapra, Sipna, Gadga and Dolar, all of which are tributaries of the river Tapti (Melghat Tiger Project, 2018)

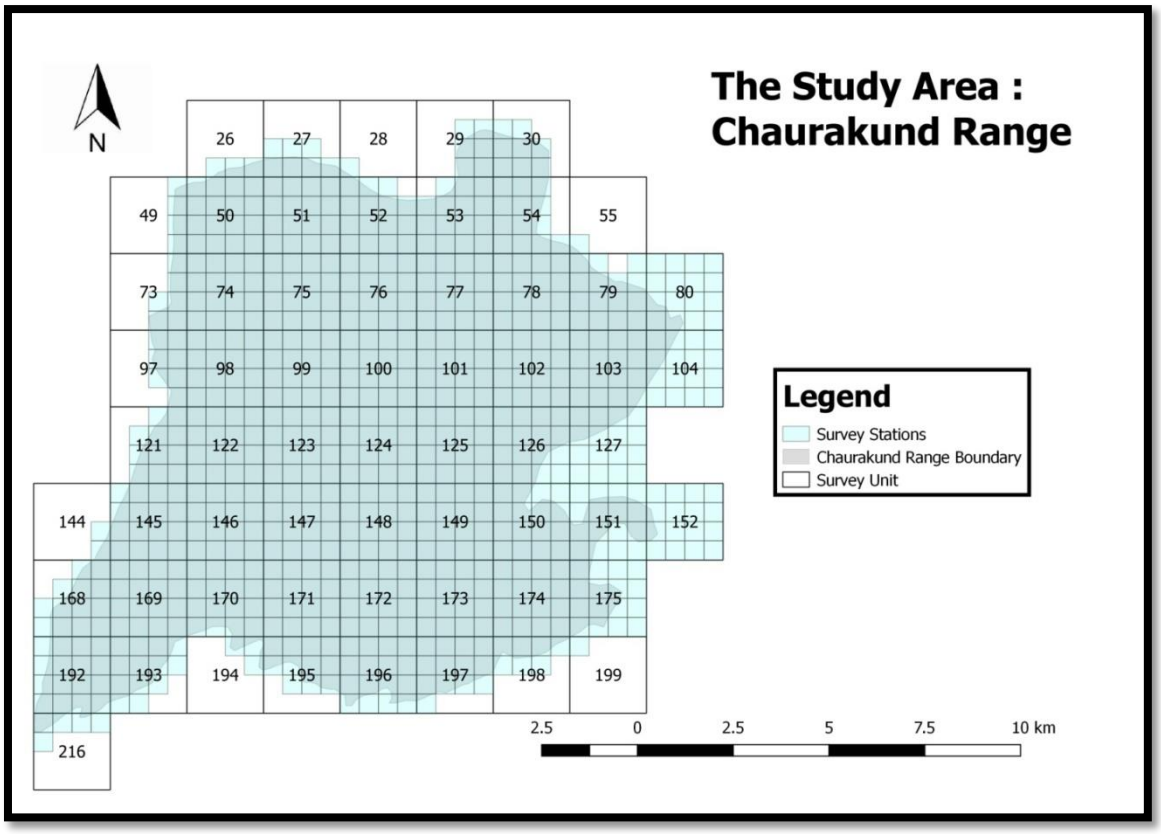


Figure 1: Map of the study area.

The tiger reserve is divided into divisions which are further divided into different ranges. The intensive study area was chosen as Chourakund Range under the Sipna Division of the Tiger Reserve. It is located at 21.63443 N 77.1478 E. The Range also includes small villages like Chaurakund, Tangra, Kutanga, Rangubali etc. The area has three tribal communities which are the Gavali, the Korku and the Goond.

Climate of MTR.

The area experiences a good rainfall during monsoon which varies from 950 mm to 1400 mm with average number of rainy days about 65 to 60. Temperature varies considerably with altitude. The high hills plateau and valleys to the North of Gavilgarh ridge are cooler in summer than the southern foothills. The plateau and high hills enjoy almost equitable pleasant climate throughout the year. The average mean maximum annual temperature is 46^0C and the average mean minimum temperature is 4^0C. (Melghat Tiger Project, 2018)

3.2 Methodology

The study was carried out from 3rd week of December 2017 till 1st week of April 2018. The aim of my study was to carry out a preliminary assessment of distribution of owls in the study area. The objectives and methods used to achieve each objective is described as below:

Objective 1: To understanding the distribution of large and small owl species found in the study area.

To assess the diversity of owls present in the area, we carried out a distribution survey. The owls were located using the call broadcasting techniques and through visual scanning with the help of binoculars and cameras. The surveys were carried out from 06.30 hrs. to 10.30 hrs. And from 16.00 hrs. to 19.00 hrs. In case of night surveys, the surveys started around 18.30 hrs. and continued till 21.30 hrs. The Chaurakund range was divided into survey units and survey stations. Survey units were 2km X 2km grids, while each survey unit is further divided into 16 smaller units which were named as survey stations. According to the earlier established work done by WRCS, the study area was divided into 61 Survey Units.

The distribution surveys were conducted in the following ways:

(a) Grid Survey: In grid survey each survey unit was visited on foot and depending on the accessibility about 5 to 6 survey stations in each survey unit were surveyed. In each survey station owl calls were broadcasted for duration of two minutes and waited for the response for three minutes. The positive or negative response was recorded in the distribution datasheets.

(b) Route surveys. The route surveys were carried out on foot along the motorable roads. At every 500 m distance on the road we broadcasted the owl calls for a time period of two minutes and waited for the response for three minutes. At each broadcast point we played the call twice for each owl species and recorded positive or negative response.

For both the distribution surveys we recorded parameters such as owl species seen or heard, GPS coordinates, habitat where it was observed etc. In order to eliminate uncertainty the distribution surveys were conducted multiple times at different time intervals for all the routes and grids surveyed.

Objective 2: To identify the parameters of nest site selection among the different owl species in the study area.

We tried to locate minimum 2 roosts and nest sites of each owl species found in the study area. Verification of owl roost or nest was carried out following the methods described below: While surveying, if we heard the owl call or saw an owl, then we would follow the direction of its call and observe their roosting sites. We also monitored the trees for entering or exiting tree cavities. Indirect signs such as feathers, white wash and pellets found near the prospective nest cavity or near the nest tree were also monitored.

We also used a few camera traps to confirm the nest sites. We set up the cameras facing the nest cavity to observe the nest for time periods of 48 hours, to confirm the nests. Once the nest was confirmed, habitat sampling was conducted. A number of parameters were recorded in 20m X 20m grids with the nest tree as the center point. For each plot, all trees which were greater than 30 cm in GBH were assessed for their species, height and GBH. From the center of each plot, using two step method (Smith et al 1999), transects were taken in four cardinal direction to record shrub and ground cover.

To assess human presence near the nest area, we counted signs of fresh tree cutting, livestock dung, forest fire and tree lopping and presence of human trails. The distance of nest tree from nearest forest opening, village and road were also measured.

Multiple nesting parameters were observed to understand the nesting habitat of the Owl species. The nesting habitat parameters were divided into four major categories which were location, ground cover, terrain and vegetation cover (Table 1). Data sheets were developed with all the above mentioned parameters and all data were recorded in the same as well. For each nest five grids were studied which were one nest plot and four plots at 150 meters away in four cardinal direction from the nest plot.

During the Habitat sampling the area was also scanned for pellets. Pellets were collected and stored in zip lock plastic bags. They were labeled and a detailed record consisting of GPS coordinates, Place of Collection, bag number and owl species was recorded.

Table 1: Major categories of Nesting Habitat

Location	Terrain	Ground Cover	Vegetation Cover
Survey unit	Slope	Soil	Tree Species
Survey Station	No. of bamboo clumps	Leaf Litter	Percentage tree species
Comp. No.	No. of cut bamboo clumps	Vegetation	Average GBH
GPS Coordinates (N,E)	Tree Cutting		Average Height
Altitude(m)	Percentage of Invasive weed species		Shrub Species
Distance from road (m)			Intercept (cm)
Distance from village (km)			

Objective 3: To comprehend the different behavior and vocalization patterns of owl species.

Each owl species was visited once a week and through ocular observation the general behavior of the owl species was studied. Initially we started the observation by broadcasting owl calls in areas which had confirmed owl presence. Once the owl was spotted it was continuously monitored and followed till we lost site. To understand the daily routine of the owl, it was monitored for a time period of 4 hours each in the morning and evening. The observations were recorded every 15 minutes with a break in between and were taken from a minimum distance through binoculars and cameras. Apart from written observations, pictures and videos were also taken to understand the owls better. Calls produced by the owl individuals were also recorded using a recorder.

Chapter 4

Results

4.1 Distribution of Large and Small Owl species

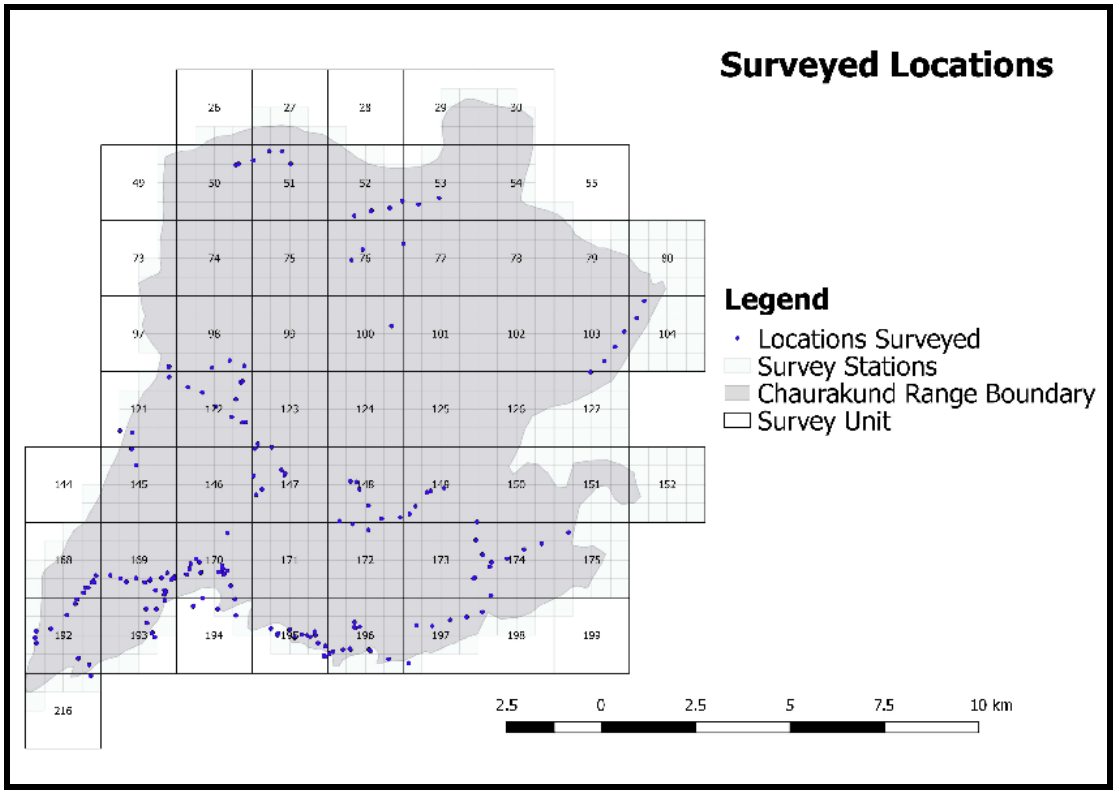


Figure 2: Map of the study area showing the locations surveyed during Owl Distribution Survey

Grid Survey: The study area was divided in 61 grids of 2 km x 2 km. During the time allotted, I sampled 33 grids about 54 % of the study area and 528 survey stations accounting for an area of 132 square kilometers. Figure 2 shows surveyed locations.

Route Survey: I surveyed totally 25 routes covering 43 km on roads by a vehicle.

We detected total eight species of owls, which were the Indian Eagle Owl, Brown Fish Owl, Mottled Wood Owl and Barn Owl which were among large owls while the smaller owls include the Indian Scops Owl, Forest Owlet, Spotted Owlet, and Jungle Owlet.

These Owls were observed to be in 58 different locations in the Chaurakund range. The detections of all the owl is shown in Figure 3

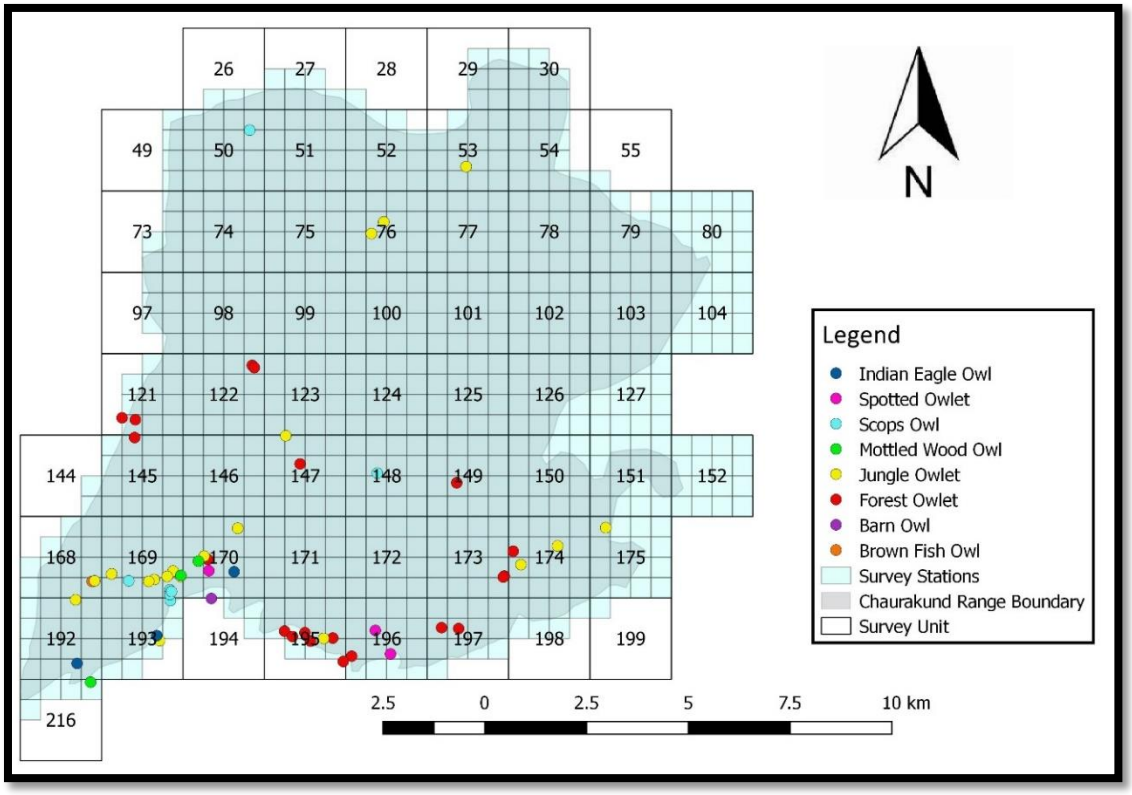


Figure 3: Map showing location of Owls Detected in Chaurakund Range

Amongst the eight Owl species found two owl species namely Brown Fish Owl and Barn Owl were just detected in one location each in the range showing the presence of the owl species in the area. The other owl species were present at multiple locations in the study area. Table 2 gives details on detections of owl species.

Table 2: Detections of Owl species in Chaurakund Range

Owl Species	No. of Adults Individuals	No. of Juveniles Individuals	No of Survey Units(detected on)	No of survey routes(detected on)
Indian Eagle Owl	6	5	3	1
Brown Fish Owl	1	0	1	1
Mottled Wood Owl	4	0	3	0
Barn Owl	1	0	1	0
Indian Scops Owl	9	0	4	4
Forest Owlet	29	1	9	6
Spotted Owlet	5	0	2	0
Jungle Owlet	21	1	11	12

Following section provides details on detection and distribution of individual owls in the study area.

Indian Eagle Owl

We detected eleven individual of Indian Eagle Owl in 3 locations.

Table 3: Detection of Indian Eagle Owl in the Study Area

Survey Unit	Survey Station	No of Adults	No of Juveniles
170	2920	2	2
192	3397	2	0
193	3207	2	3

Amongst the 11 individuals 6 individuals were observed to be adults while 5 individuals were observed to be juveniles (Table 3). All three locations were riverine areas which had seasonal streams with a large number of rocks. Agricultural fields were also recorded in close proximity of these locations (Fig 4)

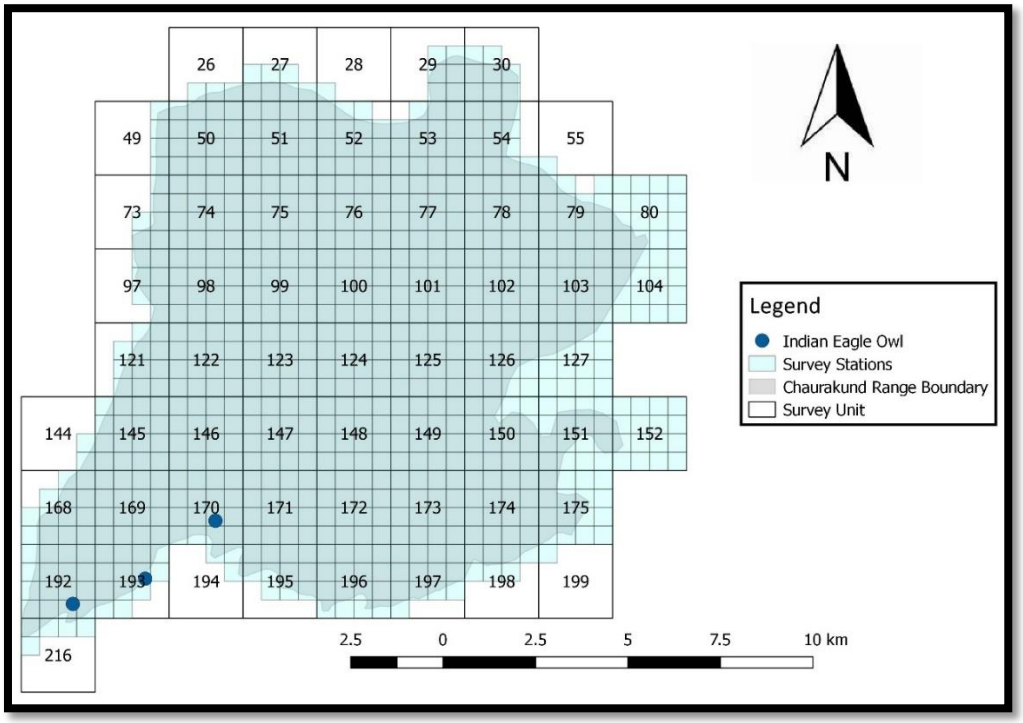


Figure 4: Map showing the locations of Indian Eagle Owl.

Mottled Wood Owl

We spotted 4 individual of Mottled Wood Owl in 3 locations, in the Chaurakund range.

Table 4: Detection of Mottled Wood Owl in the Study Area

Survey Unit	Survey Station	No of Adults	No of Juveniles
169	2917	1	0
170	2918	2	0
216	3495	1	0

All the 4 individuals observed were found to be adults while no juveniles were observed in the study area (Table 4). All the above mentioned location had dense forest cover in the areas with dominance of *Madhucalongifolia*trees (Figure 5).

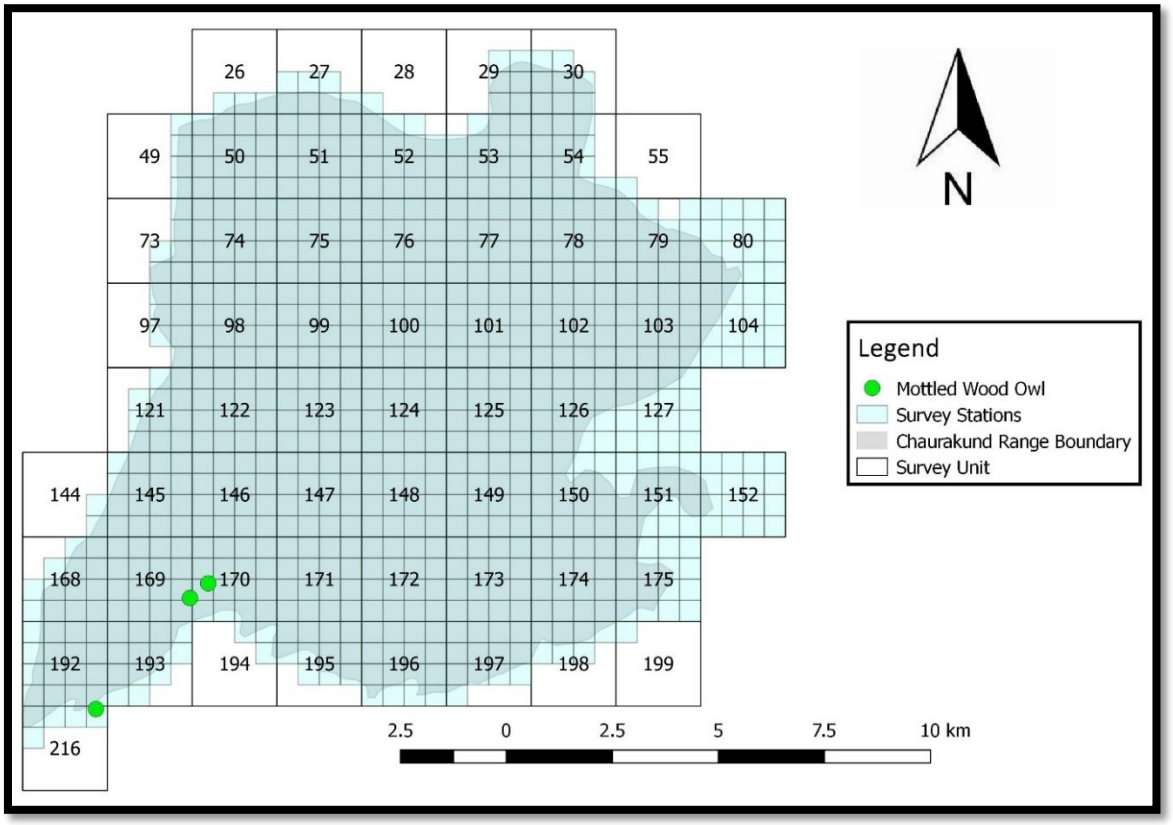


Figure 5: Map showing the locations of Mottled Wood Owl.

Indian Scops Owl

A total of 9 individual of Indian Scops Owl were spotted in 8 locations.

Table 5: Detection of Indian Scops Owl in the Study Area

Survey Unit	Survey Station	No of Adults	No of Juveniles
50	787	2	0
148	2442	1	0
169	3014	4	0
169	3012	1	0
193	3111	1	0

All the 9 individuals observed were found to be adults while no juveniles were observed in the study area (Table 5). The Indian Scops Owl was generally found roosting inside the nest cavity. The nest cavities were large elongated holes which were found on broken trees. The Indian Scops Owls were found in nine locations in 193, 169, 148, and 50 Survey units, 7 nest locations were observed to be concentrated in survey units 193 and 169 (Figure 6). A map showing the nine locations of the Indian Scops Owl is as follows:

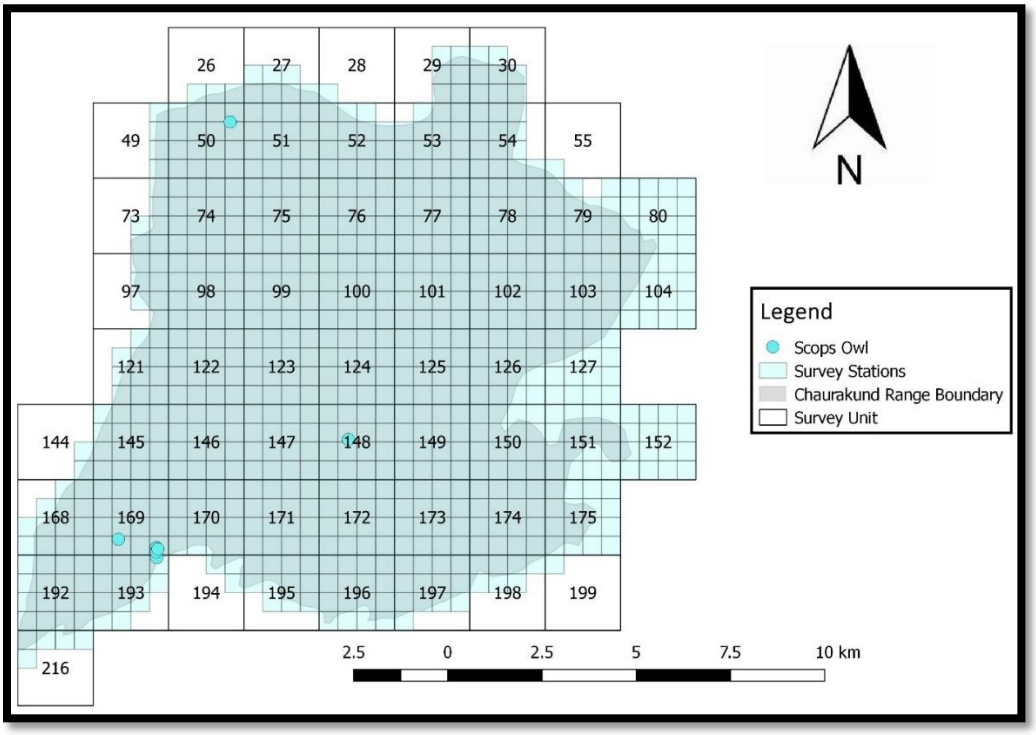


Figure 6: Map showing the locations of Indian Scops Owls.

Forest Owlet

In the study area, we spotted 30 individual of Forest Owlet in 20 locations.

Table 6: Detection of Forest Owlet in the Study Area

Survey Unit	Survey Station	No of Adults	No of Juveniles
121	2139	1	0
121	2236	2	0
122	1951	3	0
122	2048	1	0
147	2438	2	0
149	2543	1	0
170	2919	1	0
173	2933	4	0
174	2837	2	0
195	3213	1	0
195	3214	3	0
195	3216	2	0
195	3312	2	0
195	3410	2	0
196	3314	1	0
197	3221	0	1
197	3222	1	0

Amongst the 30 individuals 29 individuals were observed to be adults while a single juvenile was observed in the study area. The Forest Owlets were found in Survey units 121, 122, 147, 149, 170, 173, 174, 195, 196 and 197. Survey unit 195 had 6 locations of the Forest owlet spread in 6 different survey stations (Table 6). Out of the entire eight owls species Forest Owlet was observed to be the most widely distributed owl species in the study area (Figure 7).

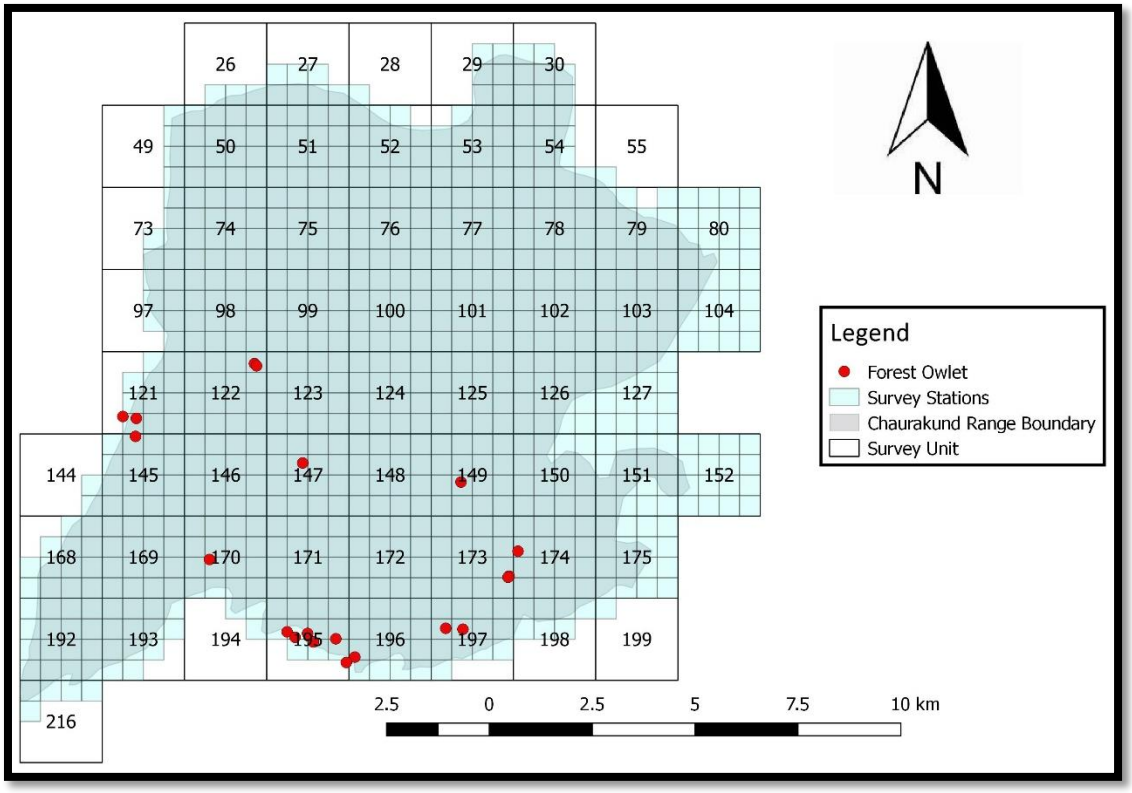


Figure 7: Map showing the locations of Forest Owlet.

Spotted Owlet

In the Chaurakund range, we spotted 5 individual of Spotted Owlet in 3 locations.

Table 7: Detection of Spotted Owlet in the Study Area

Survey Unit	Survey Station	No of Adults	No of Juveniles
196	3316	2	0
196	3218	2	0
170	2919	1	0

All the 5 individuals observed were found to be adults while no juveniles were observed in the study area (Table 7). The Spotted Owlets were located very close to agricultural fields situated in the outskirts of the villages (Figure 8).

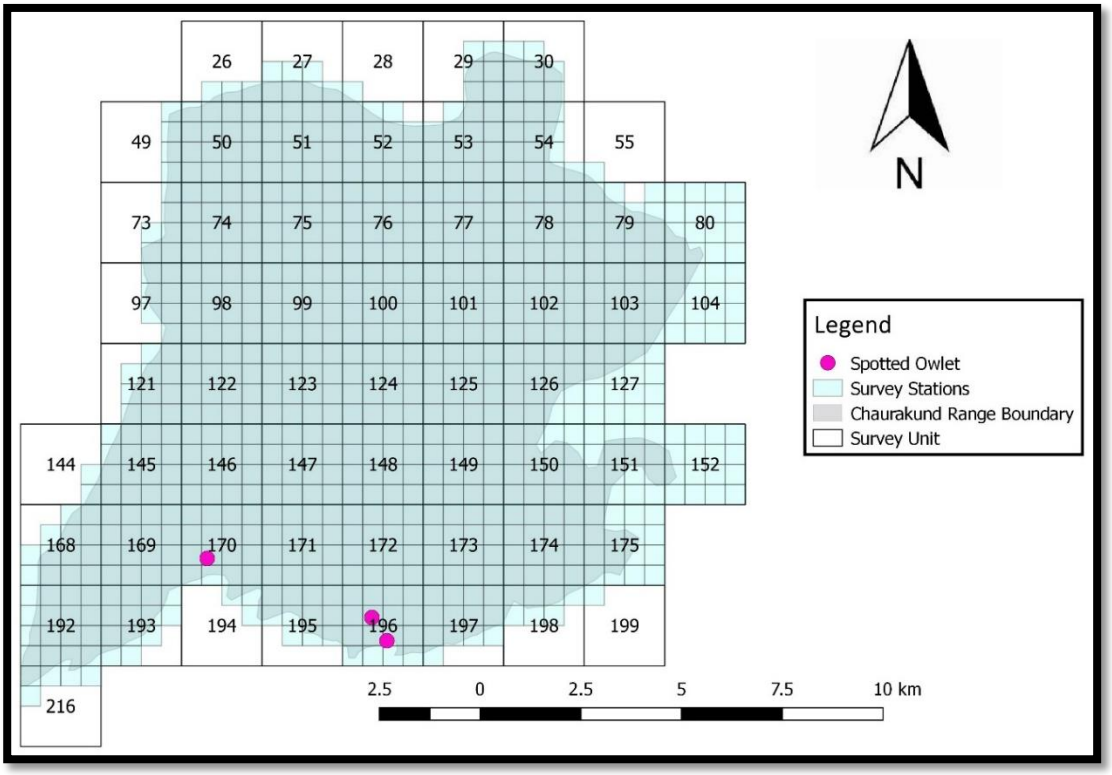


Figure 8: Map showing the locations of Spotted Owlet.

Jungle Owlet

22 individual of Jungle Owlet were recorded in 19 locations.

Table 8: Detection of Jungle Owlet in the Study Area

Survey Unit	Survey Station	No of Adults	No of Juveniles
53	991	0	1
76	1375	1	0
76	1278	1	0
147	2341	2	0
168	3010	2	0
169	2914	1	0
169	2917	3	0
169	3013	2	0
170	2726	1	0
170	2822	1	0
174	2839	1	0
174	2942	1	0
175	2744	2	0
192	3106	1	0
193	3304	1	0
195	3215	1	0

Amongst the 22 individuals 21 individuals were observed to be adults while a single juvenile was observed in the study area (Table 8). The Jungle Owlets were

found to be spread across 11 Survey units which were as follows 53, 76, 123, 168, 169, 170, 192, 193, 195, 174, and 175. Survey units 168, 169 and 170 had 9 locations of the Jungle Owlet clustered together. Jungle Owlet was observed to be the second most widely distributed owl species in the study area (Figure 9).

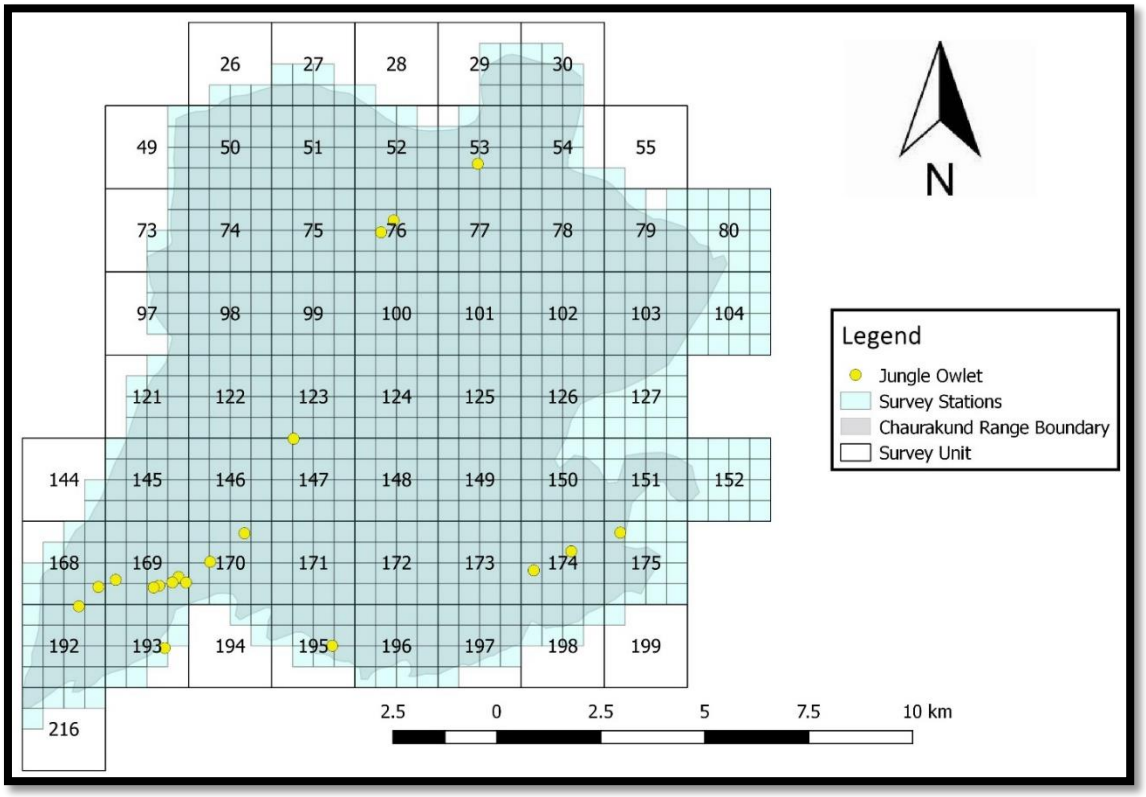


Figure 9: Map showing the locations of Jungle Owlet.

4.2 Nesting Habitat of Large and Small Owl species

4.2.1 Nest Location

According to the distribution survey eight owl species were found in the Chaurakund Range. During the entire duration of the study, Brown Fish Owl and Barn Owl were just spotted once in the area. Due to the same, nests of only six owl species were studied. The nest of each owl had unique characteristics and location preference. A table showing the unique factors of the nest for each species is listed below:

Table 9: Observed Nest Location and Nesting habitat

Nest No.	Owl Species	Nesting Habitat observed	Survey unit	Survey Station	Nest Tree Species	Nest Tree Height (m)	Nest Tree GBH (cm)
IEO1	Indian Eagle Owl	Rocky cliffs near water bodies & agricultural fields	170	2920	-	-	-
IEO2			193	3207	-	-	-
MWO1	Mottled Wood Owl	dense forest areas away from human settlements	170	2918	*Madhuca longifolia*	18	255
MWO2			216	3495	*Schleichera oleosa*	16	398
SCO1	Indian Scops Owl	Open forest areas close to forest road.	193	3111	*Tectona grandis*	23	119
SCO2			169	3014	*Tectona grandis*	13	128
SCO3			50	884	*Tectona grandis*	13	101
FO1	Forest Owlet	Open forest areas	195	3410	*Tectona grandis*	16	50
FO2			195	3233	*Tectona grandis*	20	172
SPO1	Spotted Owlet	Agricultural fields close to human settlements	196	3218	*Tectona grandis,*	18	190
SPO2			170	2919	*Butea monosperma*	19	138
JO1	Jungle Owlet	Dense forest areas away from human settlements	168	3010	*Tectona grandis*	28	106
JO2			169	3013	*Tectona grandis*	19	96

4.2.2 Location of Nesting Habitat of Owls

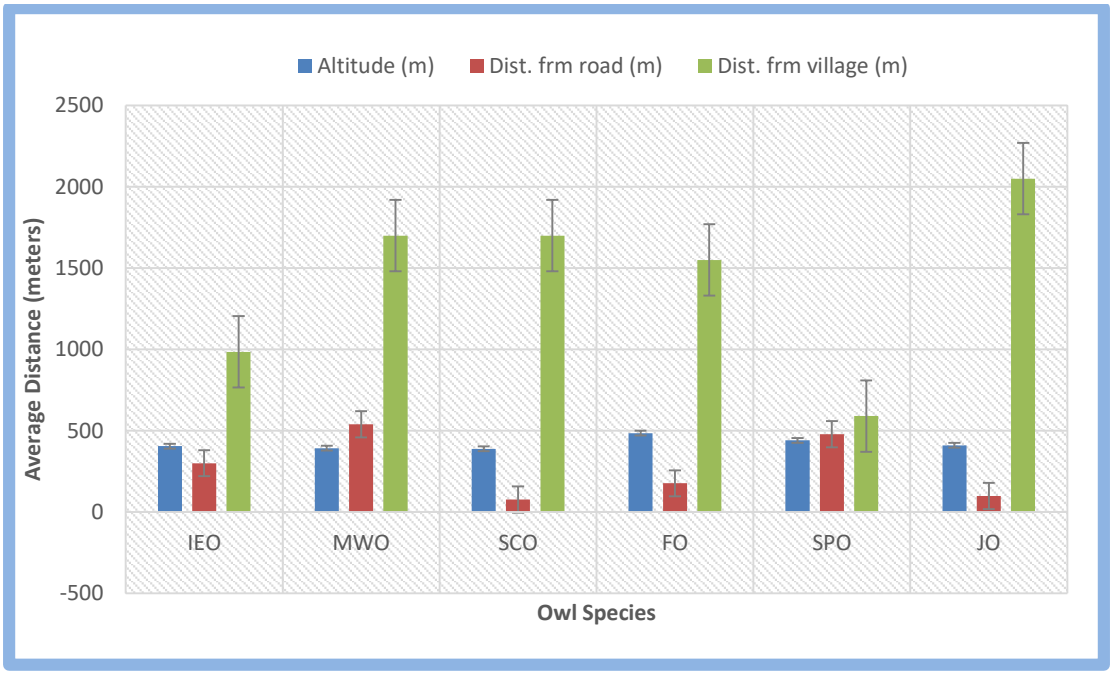


Figure 10: Graph showing comparative analysis of nesting variables (Location)

The nests of all the owl species were observed to be at a significant distance from the villages in the area. Nests of Jungle owlet, Mottled Wood Owl, Indian Scops Owl and Forest Owlet were farthest from the villages while Spotted Owlet and Indian Eagle Owl were observed to be the closest to the villages. Mostly all the nests of all the Owls species were observed to be in a range of 388 to 485 meters in altitude. The distance from the forest roads was also not more than 600 meters and Mottled Wood Owl was about 540 meters away from the local forest road.

4.2.3 Ground Cover

The Ground cover was analyzed to understand the surface cover near the nest, three parameters were observed using the two step method (Figure 11). The ground cover for mostly all the owls were different. Jungle Owlet, Mottled Wood Owl, Indian Scops Owl and Forest Owlet had more leaf litter in their habitat plot while in case of Spotted Owlet and Indian eagle owl the ground cover had more of vegetation and soil cover compared to leaf litter.

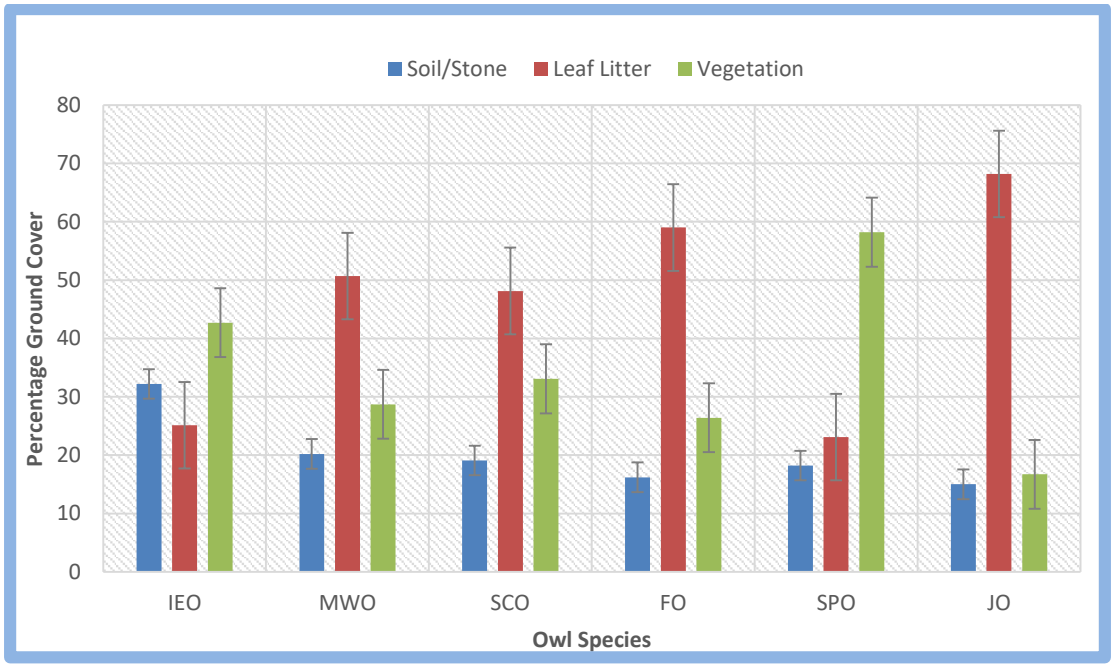


Figure 11: Graph showing comparative analysis of nesting variables (Ground Cover)

Indian Eagle Owl had a significant amount of rocks in its habitat as well. Indian Scops Owl and Mottled Wood Owl show a similar trend in ground cover both show moderate amount of leaf cover and lesser vegetation and soil cover.

4.2.4 Disturbance

The Disturbance in the nest plots was observed based on the number of bamboo cut clumps, number of tree stumps cut and the number of cow dung cakes present in the area. Indian Scops Owl followed by Jungle Owlet had more clumps of bamboo in their nest perimeter while other owls had low number of bamboo clumps. As compared to the number of bamboo clumps present the number of cut bamboo clumps was low most of the Owl species, while in case of the Indian Scops Owl the number of cut bamboo clumps was the highest. This indicates higher level of disturbance in the nest plots of Indian Scops Owl as compared to the other Owls. The number of tree cuttings in the area and in case of all the observed owl species was less than 10 in number. The habitat of Indian Eagle Owl and Spotted Owlet were observed to have more number of dung cakes than the Indian Scops Owl, Mottled wood Owl, Forest Owlet and Jungle owlet indicating more disturbance due to cattle.

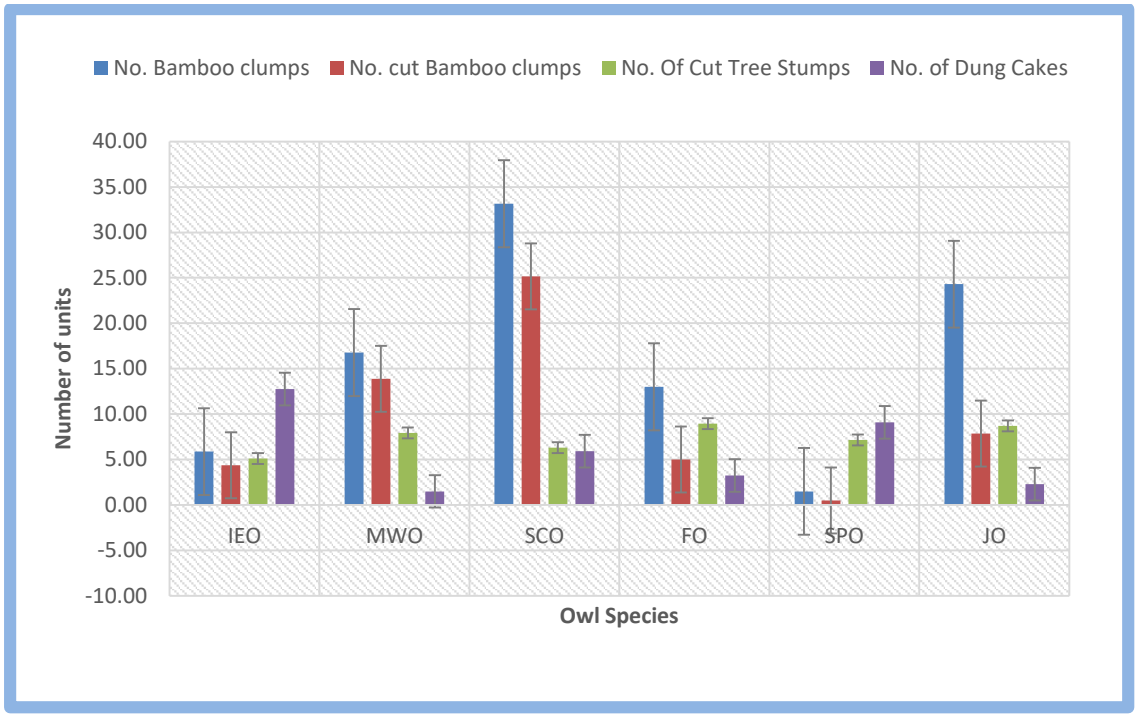


Figure 12: Graph showing comparative analysis of nesting variables (Disturbance)

4.2.5 Vegetation Cover

In total about 24 tree species were recorded in the nesting habitat. All the Owl species had teak dominance in the nest plots sampled. Indian Eagle Owl nest plots had 20.22% of *Terminalia arjuna*, while small percentage of *Garuga pinnata* and *Wrightia tinctoria* were also observed (Table 10).

Table 10 : Tree Diversity in nest plot of Indian Eagle Owl

Samples	Tree Species	% tree species	Average GBH	Average Height
IEO 1	*Terminalia arjuna*	11.66	206 (±43.84)	15 (±1.41)
	Butea monosperma	9.16	43.25 (±22.5)	7.5 (±4.16)
	Garuga pinnata	6.66	58 (±0)	4 (±0)
	Tectona grandis	36.25	118.20 (±59.21)	18.64 (±3.76)
	Haldina cordifolia	5	210 (±0)	4 (±0)
	Wrightia tinctoria	5	151 (±0)	10 (±0)
	Diospyros melanoxylon	5	32 (±0)	3 (±0)

	Aegle marmelos	1.25	58 (±0)	9 (±0)
IEO 2	*Sterculia urens*	3.33	70 (±0)	12 (±0)
	Garuga pinnnata	3.33	60 (±0)	5 (±0)
	Tectona grandis	20.48	128.29 (±57.16)	17.71 (±4.11)
	Wrightia tinctoria	10	63 (±27.18)	7.33 (±1.53)
	Butea monosperma	9.52	124 (±69.3)	7.5 (±0.71)
	Terminalia arjuna	33.33	213.75 (±62.9)	16.25 (±0.96)

Mottled Wood Owl had presence of tree species like: *Butea monosperma* (10.71%), *Madhuca longifolia* (2.87%), *Buchanania lanzan* (15.93%), *Wrightia tinctoria* (11.3%) (Table 11).

Table 11 : Tree Diversity in nest plot of Mottled Wood Owl

Samples	Tree Species	% tree species	Average GBH	Average Height
MWO 1	*Tectona grandis*	81.43	123.04 (±23.14)	19.97 (±5.11)
	Butea monosperma	10.71	62.5 (±8.66)	5.25 (±1.53)
	Madhuca longifolia	2.86	255 (±0)	18 (±0)
	Terminalia arjuna	5	230 (±0)	15 (±0)
MWO 2	*S. oleosa*	4	398 (±0)	16 (±0)
	Tectona grandis	46.54	92.96 (±37.15)	17.63 (±5.27)
	Buchanania lanzan	15.94	64.83 (±27.41)	9.67 (±3.91)
	Wrightia tinctorial	11.30	52.75 (±13.55)	5.87 (±1.03)
	B. racemeser	2.22	37 (±0)	7 (±0)

Indian Scops Owl nest were observed on broken teak trees and the nest cavities were elongated. The Nest plots had small percentages of *Mitragyna parviflora* (10%), *Diospyros melanoxylon (11.27%), Syzygium cumini (13.3%) (Table 12).*

Table 12 : Tree Diversity in nest plot of Indian Scops Owl

Samples	Tree Species	% tree species	Average GBH	Average Height
SCO 1	*Tectona grandis*	33.49	126.69 (±39.02)	20.24 (±4.82)
	Diospyros melanoxylon	11.27	60.83 (±16.49)	3.33 (±1.49)
	Buchanania Lanzan	2.86	104 (±0)	15 (±0)
	Cassia fistula	2.86	59 (±0)	4.5 (±0)
	Lagerstroemia parviflora	2.86	51 (±0)	7 (±0)
	Terminalia arjuna	6.67	500 (±0)	27 (±0)
	Syzygium cumini	13.33	102.5 (±67.18)	5 (±1.41)
SCO 2	*Tectona grandis*	50.5	125.67 (±22)	13.77 (±4)
	Haldina cordifolia	2.5	190 (±0)	20 (±0)
	Diospyros melanoxylon	4.5	39.5 (±8)	7.5 (±4)
	Wrightia tinctoria	8.5	66 (±14)	5 (±3)
	L. coromandelica	6	101.33 (±21)	12.66 (±2)
	Butea monosperma	8	47.5 (±18)	3 (±0)
SCO 3	*Lagerstroemia parviflora*	4.67	39.33 (±10)	6 (±2)
	Terminalia tomentosa	5.33	168.5 (±73)	20 (±3)
	Flacortia indica	1.33	77 (±0)	6 (±0)
	Tectona grandis	50	79.709 (±30)	15.74 (±6)
	Aegle marmelos	6.67	53.25 (±1)	7.25 (±2)
	Wrightia tinctorial	7.33	51 (±24)	6 (±1)
	Diospyros melanoxylon	7.33	46.5 (±23)	7.5 (±5)
	Buchanania lanzan	7.33	80.25 (±59)	9.625 (±18)
	Mitragyna parviflora	10	165 (±0)	20 (±0)

Forest Owlet had dominance of *Tectona grandis* and very small percentages of *Butea monosperma, Acacia Pennata and Diospyros melanoxylon (Table 13).*

Table 13 : Tree Diversity in nest plot of Forest Owlet

Samples	Tree Species	% tree species	Average GBH	Average Height
FO 1	*Tectona grandis*	61.67	110.44 (±61.92)	14.95 (±2.63)
	Butea monosperma	3.33	43.00 (±0)	10 (±0)

	Acacia Pennata	3.33	32 (±0)	8 (±0)
	Diospyros melanoxylon	3.33	25 (±0)	10 (±0)
	Garuga pinnata	3.33	32 (±0)	12 (±0)
	Ziziphus mauritiana	2.50	53 (±0)	10 (±0)
	Phyllanthus emblica	2.50	50 (±0)	12 (±0)
FO 2	*Tectona grandis*	94.74	91.16 (±45.04)	15.99 (±5.35)
	Aegle marmelos	1.33	64 (±0)	7 (±0)
	Lagerstroemia parviflora	1.43	76 (±0)	15 (±0)
	L. coromandelica	2.50	48.33 (±4.93)	8.33 (±4.16)

Nest habitats of Spotted Owlet had very few trees as compared to other Owls species and the trees were *Haldina cordifolia*, *Butea monosperma* and *Mangifera indica (Table 14).*

Table 14 : Tree Diversity in nest plot of Spotted Owlet

Samples	Tree Species	% tree species	Average GBH	Average Height
SPO 1	*Tectona grandis*	30	118.5 (±0)	17.5 (±0)
	Haldina cordifolia	10	45 (±0)	6 (±0)
SPO 2	*Tectona grandis*	40	128 (±13.99)	18.87 (±1.49)
	Butea monosperma	20	77 (±0)	2 (±0)
	Mangifera indica	20	420 (±0)	11 (±0)

Jungle Owlet had small Percentages of *L. coromandelica (22.6%), Butea monosperma (10.35%) (Table 15).*

Table 15 : Tree Diversity in nest plot of Jungle Owlet

Samples	Tree Species	% tree species	Average GBH	Average Height
JO 1	*Tectona grandis*	57.09	101.32 (±31.32)	19.09 (±5.41)
	L. coromandelica	22.67	76.75 (±53.12)	15.69 (±5.09)
	Wrightia tinctoria	2.86	50 (±0)	10 (±0)
	Lagerstroemia parviflora	5.71	37.5 (±3.35)	11.5 (±3.35)
	B. racemosa	6.67	50 (±0)	6 (±0)
	Butea monosperma	5	91 (±72.12)	11 (±2.83)
JO 2	*Tectona grandis*	81.42	98.36 (±40.77)	17.35 (±5.96)

	Butea monosperma	10.36	158.75 (±147.38)	12.87 (±3.5)
	Diospyros melanoxylon	5.36	99.01 (±19.09)	12.74 (±3.53)
	Wrightia tinctoria	2.86	39 (±0)	8 (±0)

4.2.6 Pellet Collection

During the study while habitat sampling the nest sites were also scanned for pellets. We collected 34 pellets of different owl species (Table 17).

Table 16: Pellets collected

Sno.	Survey Unit	Survey Station	Owl Species	No. of pellets collected
1.	170	2920	Indian Eagle Owl	13
2.	192	3397	Indian Eagle Owl	1
3.	193	3207	Indian Eagle Owl	8
4.	170	2918	Mottled Wood Owl	2
5.	194	3113	Barn Owl	1
6.	195	3214	Forest Owlet	1
7.	196	8218	Spotted Owlet	6
8.	196	3316	Spotted Owlet	2
			TOTAL	34

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Plate 9: Pellets and feathers collected.

4.3 Behavior patterns of large and small owl species

4.3.1 Time Activity Budget

The minimum distance from which the observation was collected was in a range of 30 – 50 meters. During the observation period the Owls were observed to be involved in multiple activities, for the purpose of better understanding the activities were categorized in different classes and the observations were recorded. The table given below shows the categorization of the activities (Table 12).

Table 17: The list of activity classes observed during Behavior monitoring

S.No.	Activity Classes	Activities	Description
1	Foraging	Foraging	A wide search over an area in order to obtain food
		Scanning	Looking around an area carefully
		Feeding	An act of providing food
		Tail Flickering	Rapid motion of the Tail
2	Maintenance	Preening	Straightening and cleaning of feathers with the help of the beak
		Stretching	Straighten or extend one's body or a part of one's body to its full length
		Gular Fluttering	Rapid vibrations of the gular (throat) skin to counteract overheating
3	Vocalization	Vocalization	To produce sounds, calls or songs as an act of communication
4	Roosting	Perched	Alight or rest on something
5	Sleeping	Sleeping	Inhibition of nearly all voluntary muscles to rest
		Yawning	Involuntarily opening the mouth wide and inhaling deeply
6	Moving	Moving	In motion through flight or walking.

According to the activity classes the observations were calculated for each owl species (Figure 13)

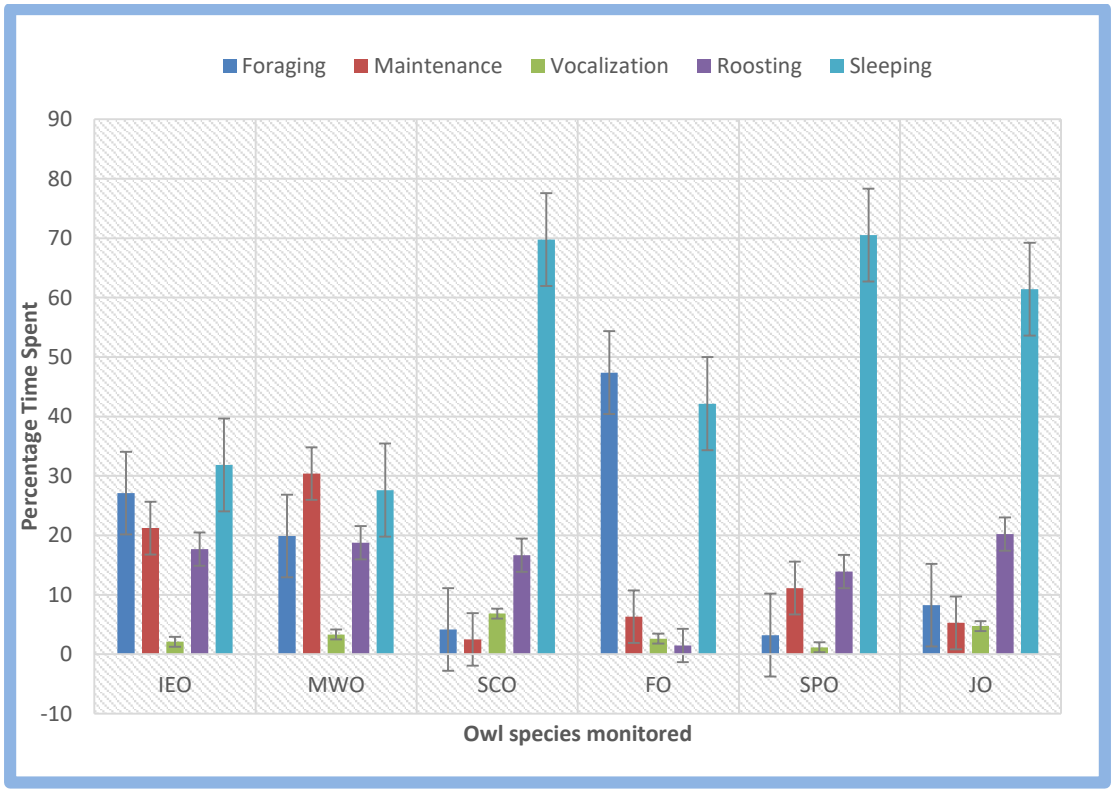

Figure 13: Time Activity Budget comparing the observed Owl species

Our observations indicated that except the Forest Owlet, all the other owls were observed to be dedicating more time in sleeping and very less amount of time in foraging during the day time. Our observations confirm that the Forest Owlet is diurnal while the other owls are nocturnal/ or crepuscular.

The maximum time allocated for maintenance was observed in case of Mottled Wood Owl followed by the Indian Eagle Owl. While in case of the other owls the time dedicated in maintenance was comparatively less. The Indian Scops Owl was observed to be inside the nest cavity for major part of the day it was not observed to be involved in maintenance.

The observation indicated that the amount of time allocated towards vocalization was low in case of all the owl species when compared to the other activities like roosting, maintenance etc. All owl species dedicated a significant amount of time roosting during the day but compared to the other owl species Forest Owlet dedicated lesser time to roosting during the day.

4.3.2 Behavior Patterns

During the study it was observed that the owls were most active during the morning and evening hours, while the afternoons where dedicated to maintenance activities. The mornings included activities like vocalization, scanning etc. In December and January owls were observed to be more active till late morning while with the increasing temperatures starting from February, the activity of the owls started decreasing in late mornings. While in the months of March and April the owl were observed to show very less activity in late mornings.

In the afternoons the owls were generally found to be either on dense trees or sitting really close to the trunk of the tree in a position that they could avoid maximum sunlight. Many times the owls were also spotted sitting in a position such that the wings were let down. During this period the owls were also observed to be Gular fluttering. The activity of Gular fluttering was observed more during the summer months which were March and April were the average temperature was 42^{o} C.

Mahasweta Patnaik/WRCS

Plate 10: Spotted Owlet sitting close to the tree trunk with its wings down.

Most Owl species were observed to be highly territorial, the interactions of the owls with other bird species were found to be not very friendly. During the observation periods other birds like Rose-ringed Parakeets *Psittacula krameri*, Rufous Treepies *Dendrocitta vagabunda*, Racket tailed drongos *Dicrurus*

paradiseus, Jungle babbles *Turdoides striata* were found to be tailing the owls and causing distress.

Mahasweta Patnaik/WRCS

Plate 11: Mottled Wood Owl sitting on Teak trees with Rose-ringed Parakeets tailing them.

4.3.3 Vocalization

During the study period various calls were observed and recorded for the six owl species which were the Indian Eagle Owl, Mottled Wood Owl, Indian Scops Owl, Forest owlet, Spotted Owlet and the Jungle Owlet. Each owl had a distinctive call and responded with the calls at particular situation. The calls were majorly classified in 4 types, which were as follows: contact calls, territorial calls, alarm calls and screech calls. Contact calls were calls which were mostly observed when the owl were informing the other individuals of their presence in the area and were contacting them. Territorial calls were calls generally given by breeding pairs near the nesting habitat informing other species of the owl's territory. Alarm calls were calls given by owls at times of distress or danger making other individuals aware of the situation. Screech calls were calls given by individuals at times of need. Screech calls were generally heard from juveniles and females during breeding

seasons. In case of Indian Eagle Owl contact calls and alarms were heard and observed. For Mottled wood owl contact calls and territorial calls were heard. For Forest owlet all the four types of call were observed during the study period. While in case of Indian Scops Owl, Spotted Owlet and Jungle Owlet just contact calls were observed during the study period.

Table 18: Different calls observed in the area.

Type of Calls	Indian Eagle Owl	Mottled Wood Owl	Indian Scops Owl	Forest Owlet	Spotted Owlet	Jungle Owlet
Contact Call	Observed	Observed	Observed	Observed	Observed	Observed
Territorial Call	Not Observed	Observed	Not Observed	Observed	Not Observed	Not Observed
Alarm Call	Observed	Not Observed	Not Observed	Observed	Not Observed	Not Observed
Screech Call	Not Observed	Not Observed	Not Observed	Observed	Not Observed	Not Observed

Chapter 5

Discussion

Our study has described the distribution of the owls found in the Chaurakund Range. The distribution survey indicates that there are eight species of owls in the study area. We had 83 detections of owls from 58 locations.

Of these, 11 were that of Indian Eagle Owl, 4 were of Mottled Wood Owl, 9 were of Indian Scops Owl, 30 were that of the Forest Owlet, 22 individuals of the Jungle Owlet and 5 were of Spotted Owlet.

We could detect the Forest Owlet and Jungle Owlet most commonly. The Forest Owlet was well distributed in the area. The presence of Forest Owlet can be linked to the availability of teak dominance forests (Ishtiaq and Ramani 2005, Mehta et al. 2008, 2015, 2017a, 2017b) Jungle Owlet also was widely distributed in the study area. The breeding season of Jungle Owlet starts from March to May so it is possible that the birds have established their territories and are responsive to call broadcast.

Indian Scops Owl were observed on Teak trees which were broken and the nest cavities were elongated. It also was observed that a slight disturbance near the nest tree lead the owl to move down its nest cavity into hiding.

As compared to the greater numbers of the Forest Owlet and the Jungle Owlet lesser individuals of Indian Eagle Owl, Mottled Wood Owl, Indian Scops Owl and Spotted Owlet were reported during the present study. A major factor that can be attributed behind this cause could be the specific habitat requirements of each owl species. Indian Eagle Owls are generally found in near vicinity of agricultural fields (Pande et al, 2011). This was confirmed in the present study as all the three locations where the Indian Eagle Owl were found were in close proximity of agricultural fields. Mottled Wood Owl were found in denser forest patches in the study area while the Spotted Owlet were found in outskirts of villages near agricultural fields which is very similar to the studies done in the Madurai district (Santhanakrishnan R. et al, 2010). We found presence of Brown Fish Owl and Barn Owl in the study area but multiple individuals were not found.

The nesting habitat of the different owl species was also studied. While analyzing the habitat it was observed that Indian Scops Owl, Forest Owlet, Spotted Owlet and Jungle Owlet had their nest on *Tectona grandis* with an average GBH ranging from 101-164m and an average height ranging from 16-23.5m, while Mottled

Wood Owl had its nest on *Madhuca longifolia* and *Schleichera oleosa.* Both the trees had dense leaf cover and the average GBH was 326.5m and the average height of 17m. It was found that all the nest plots had teak dominance in them while the other tree species like *Terminalia arjuna, Butea monosperma Wrightia tinctoria* etc. were found in smaller percentages. A total of 24 tree species were recorded while assessment of the nest habitat during the study. Majority of the nest plots of the owls were located away from human settlements except for Spotted Owlet. The current study provides us with a basic understanding of the nests of the six owl species recorded in the area. Further studies are required in this field to validate this result.

Through this study we also took a small step to understand the behavior patterns of the six owl species spread across the study area. Most of activities the owls were involved in were commonly observed in all the owl species. Such activities included Preening, Gular Fluttering, Roosting, Sleeping etc. Out of the six owl species observed two of the owls were diurnal in nature while the rest of the four species where nocturnal in nature. The diurnal owls include the Forest Owlet and the Jungle Owlet. These owls were found to be active during the day hours while the nocturnal owls which were Indian Eagle Owl, Mottled Wood Owl, Indian Scops Owl and the Spotted Owlet were observed to be dedicating more time to resting, roosting and sleeping than the diurnal owl species. Our study also gave us an understanding of acoustics of different owl species.

Chapter 6

Conclusion

The Present study aimed at understanding the distribution, nesting habitat and behavior patterns of large and small owls in the Chauakund region. The area holds great importance as it is home to eight different types of Owl species amongst which lies the endemic owl species, the Forest Owlet. The study focused towards the co-existence of the eight owl species in the area and it was a preliminary effort towards understanding owls. Given the time frame major aspects were studied for each owl species but in depth studies are still required in the area. This study was designed as a pilot study of the upcoming long-term study by WRCS. During the study, specific owl species such as Indian Scops Owl was recorded to be found in multiple numbers in a range of just 300 meters. Studies understanding such clusters are required in the area.

With scientific research growing every day, India should set back the superstitious believe system and focus towards understanding the importance of owls. Rather than trafficking owls for superficial traditions, awareness programs, focused group discussions should be carried out in order to change the present belief system and making people understand the ecological importance of the owls and the solutions they pose to concerning issues faced by mankind. As little information is presently available on the owls found in India work should be performed in different disciplines like Distribution, Breeding Ecology, Nesting Habitat, Behavior and Vocalization, to understand various aspects of owls. Such efforts play an important role in decision making and could lead to better future conservation of the Owls.

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