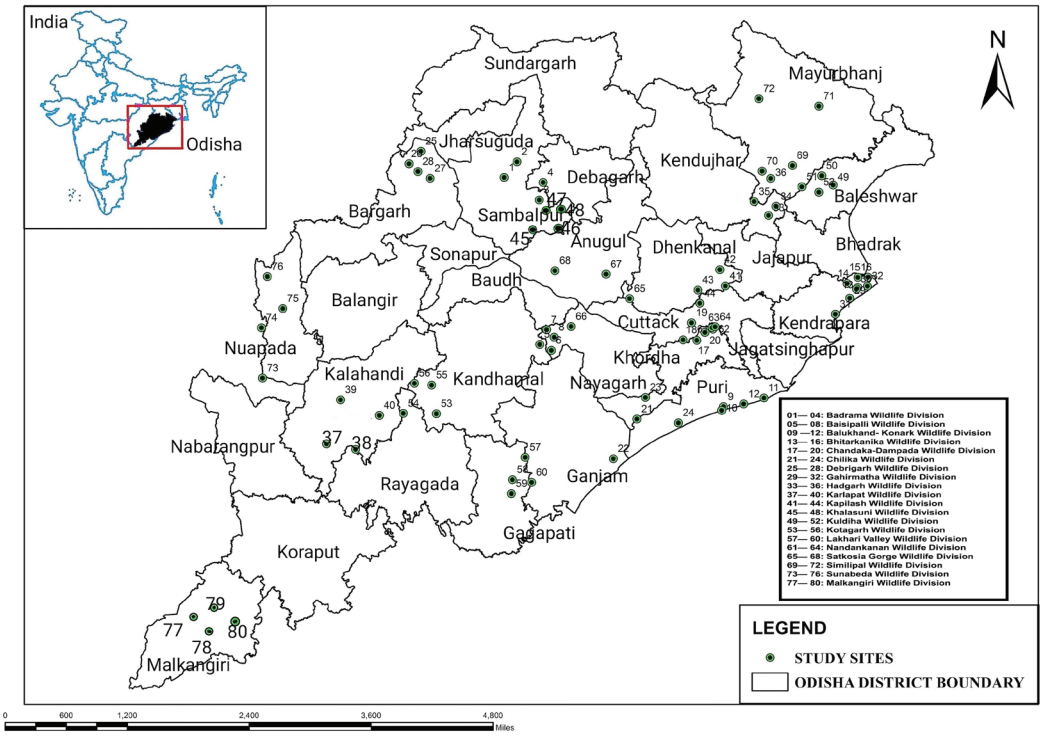
Strigiformes in Odisha's forest divisions

There are about 200 species of owls occurring globally and about 33 owl species are found in India. All the species of owls reported from India are protected under the Wildlife (Protection) Act, 1972 for their decrease in population due to deforestation and destruction of their natural habitats.

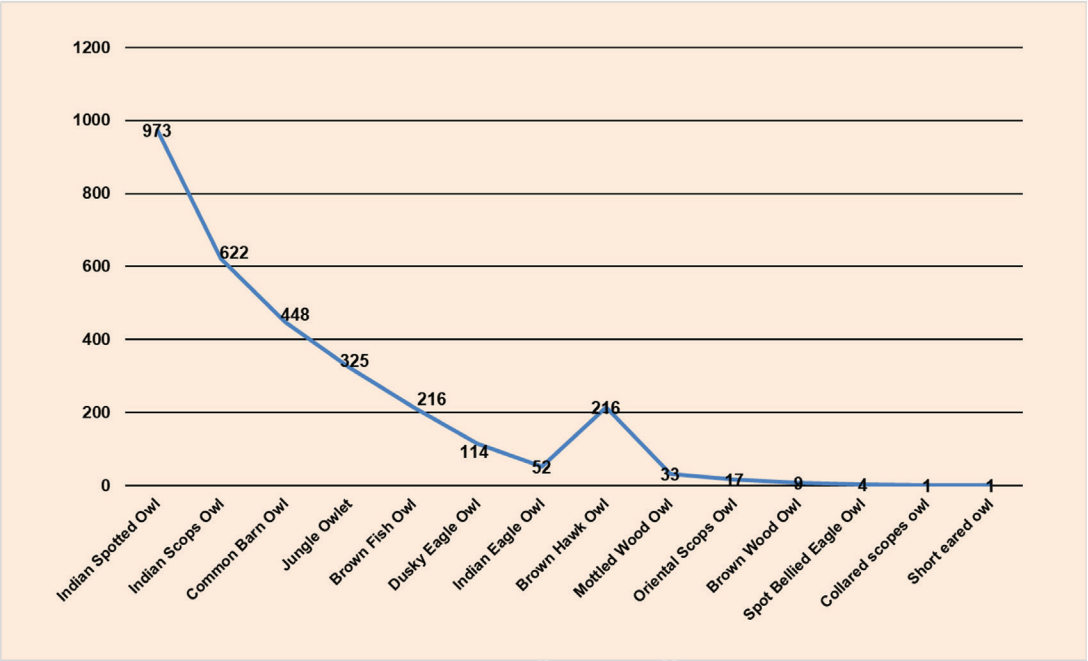
Odisha state has a total geographical area of 155,707 km², and a 52,472 km² of forest land which is about 33% of the total area. The study was conducted in 20 forest divisions in Odisha, including three prime biographic zones such as Deccan Peninsula, the Lower Gangetic Plain, and the East Coast. This area also contains four of the world's most valuable vegetation types, viz., semi-evergreen forests, tropical moist deciduous forests, tropical dry deciduous forests, and wetland forests (Champion & Seth 1968). The study begins right from the northern part (Mayurbhanj District) to southern part (Malkangiri District) of Odisha State. This article reports on distribution of owl species along with its abundance in different wildlife divisions of Odisha, India.

Method and Study area

The present study was conducted at the peripheral regions of the 20 wildlife divisions of Odisha State — 1. Badrama Wildlife Division, Sambalpur (BAW); 2. Debrigarh Wildlife Division, Sambalpur (DEW); 3. Khalasuni Wildlife Division, Sambalpur (KHW); 4. Baisipalli Wildlife Division, Nayagarh (BIW); 5. Balukhand-Konark Wildlife Division, Puri (BKW); 6. Bhitarkanika Wildlife Division, Kendrapara (BTW); 7. Gahirmatha Wildlife Division, Kendrapara (GAW); 8. Chandaka-Dampada Wildlife Division, Khordha (CHW); 9. Nandankanan Wildlife Division, Khordha (NAW); 10. Chilika Wildlife Division,



Study area map of the distribution of different species of owls and owlets in different forest divisions of Odisha.



Graphical representation of species abundance of different species of owls and owlets in different forest divisions of Odisha.

Khordha-Puri-Ganjam (CKW); 11. Lakhari Valley Wildlife Division, Ganjam-Gajapati (LAW); 12. Hadgarh Wildlife Division, Keonjhar (HAW); 13. Kuldiha Wildlife Division, Balasore (KUW); 14. Similipal Wildlife Division, Mayurbhanj (SIW); 15. Kapilash Wildlife Division, Dhenkanal (KAW); 16. Satkosia Gorge Wildlife Division, Angul (SAW); 17. Karlapat Wildlife Division, Kalahandi (KLW); 18. Kotagarh Wildlife Division, Phulbani (KOW); 19. Sunabeda Wildlife Division, Nuapada (SUW); and 20. Malkangiri Wildlife Division, Malkangiri (MAW).

The study area map is given. The peripheral region of each forest area was divided into 1,000 x 1,000 m grids as the base of the study area. Randomly, three points were selected in each grid area, mostly near corners and the centre part. Each grid was surveyed for 60 minutes and in each survey station the owl calls were broadcast twice for a duration of 3–5 minutes and a response time of 5 minutes and +ve or –ve response were observed following Celis-Murillo et al. (2012). Direct sightings were also recorded by the aid of binoculars and digital camera. Information about the presence of each owl species was also gathered from local forest staffs and villagers. Surveys were undertaken from January 2020 to December 2023, from 0500–1000 h and then late evening from 1800 h to midnight. Owl habitats were surveyed throughout the peripheral regions of individual forests. For better survey parameters such as owl species seen or heard, GPS co-ordinates along with habitat description were recorded or observed. Multiple times the grids and routes were surveyed for proper analysis. Nikon D5300 digital camera with DX NIKKOR 70–300 mm f/4.5-6.3G ED VR tele-zoom lens was used to capture the images during the survey. Fenix LR40R torch lights and Nikon ACULON A211 binocular were used to observe the individual owl species. Portable sound speaker of boAt (Stone 1000) was used to broadcast the owl calls. Garmin eTrex 22x, handheld GPS navigator was used to record the

geocoordinates. Identification of the owl species was done using standard literature of Grimmett et al. (2016) and Grewal et al. (2016). Online information was obtained from Xeno Canto Website (www.xeno-canto.org) and Deane (2020).

Results

During the study period, 14 species of Owl and Owlet were observed. Location-wise occupancy of each species is provided in the Table. The feeding habitats, abundance and IUCN Red List status of each species were also recorded during the period of survey. Population diversity of owls and owlets were represented. Field photographs of each species observed during the study period are presented. The present study aimed to understand the distribution pattern of large and small owls in different habitats of Odisha and its forest parts.

Among the total species observed, Spotted Owlet had the maximum population (933) followed by other owl species. Collared Scops-Owl and Short-eared Owl show the minimum population with their occurrence from only three forest divisions, according to the survey. During the study period the Spotted Owlet, Indian Scops-Owl, and Common Barn Owl were observed in all forest divisions of Odisha but Brown Wood-Owl and Spot-bellied Eagle-Owl were very rare and restricted to some specific forest regions only. It was also observed that Dusky Eagle-Owl was the only species that use nesting materials for preparation of nest while rest of the species depend on tree hollows and rocky cliffs. The breeding season of owls basically starts from March to May in each year when the birds establish their territories and most of them are monogamous. Through the present study it was found that the Indian Scops-Owl likes tree holes near the periphery of the woodland area adjacent to agricultural fields for nesting, while Spotted Owlet prefer tree holes near agricultural fields close to human habitation.

The Jungle Owlet favours tree hollows near forest areas away from human habitation, while the Common Barn-Owl likes tree holes at the outer limits of human habitation. The Dusky Eagle-Owl loves high trees like Eucalyptus and Casuarina forest regions near coastal regions for nesting, while Brown Fish-Owl prefers tree hollows adjacent to forest areas near water bodies. For nesting, Indian Eagle-Owls like rocky cliffs close to forested regions, while Brown Hawk-Owls choose tree hollows in forested locations far from human settlement. Mottled Wood-Owl prefers to nest in old tree hollows in thick woodland environments far from populated areas. In densely forested locations with minimal canopy, the Oriental Scops- Owl favours tree holes for nesting. For nesting, the Brown Wood-Owl favours deep, high-hill forest settings; Spot-bellied Eagle-Owls prefer large tree holes with a high canopy cover for breeding in dense forest environments. The Collared Scops-Owl and Short-eared Owl were observed to be winter visitors.

Discussion

Previously seven owl species, viz., Spotted Owlet, Indian Scops-Owl, Common Barn-Owl, Jungle Owlet, Brown Fish-Owl, Indian Eagle-

Owl, and Brown Hawk-Owl were reported from Odisha (Palei et al. 2011; Das et al. 2013). This research updates five more owl species to the checklist of Odisha avifauna as Dusky Eagle-Owl, Mottled Wood-Owl, Oriental Scops-Owl, Brown Wood-Owl and Spot-bellied Eagle-Owl and two winter migratory species as Collared Scops-Owl and Short-eared Owl.

The main factors for this outcome are the excellent availability of food (e.g., small mammals, birds, reptiles) and diversified terrains (e.g., forest cover, mountain, croplands) for the nesting and roosting purpose. But in the present scenario of poaching, electrification, deforestation etc. are the major issues for declining of owl population in Odisha. All owls are predators and depend on other animals for food, thus play an important role in the forest ecosystem. They perched at the top of food chain and often eat other predators, such as mongoose, shrews, bats and insect-eating birds.

They are natural predators of rodents, thus maintain balance in agricultural pests. Conservation of owls not only result in better rodent control but also prevent huge crop loss. Owls play a vital role for maintaining ecological diversity and they are very good bio-indicators of ecosystem health and biodiversity. High biodiversity level has been associated with owl's presence. Owls are much beneficial to farmers, and the importance of owls to agricultural communities has led the bird being incorporated as good friend of farmers. Like many other predators, owls feed on many sources of the food chain, so owls play an important role in removal of prey population

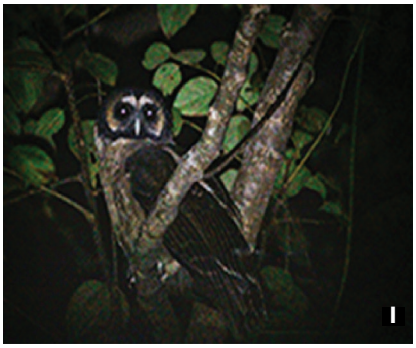
Table. Occupancy of owls and owlets species location wise. Present (+), Absent (-)

	Species	BAW	DEW	KHW	BIW	BKW	BTW	GAW	CHW	NAW	CKW	LAW	HAW	KUW	SIW	KAW	SAW	KLW	KOW	SUW	MAW
1	Spotted Owlet	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Indian Scops- Owl	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Common Barn- Owl	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	Jungle Owlet	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+
5	Brown Fish-Owl	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+
6	Dusky Eagle-Owl	-	-	-	-	+	+	+	-	-	+	-	-	+	-	-	-	-	-	-	-
7	Indian Eagle- Owl	+	+	-	+	-	-	-	+	-	-	+	+	+	+	+	+	+	+	+	-
8	Brown Hawk- Owl	-	+	-	+	+	-	-	+	-	+	+	+	+	+	-	+	+	-	+	-
9	Mottled Wood- Owl	+	+	-	+	+	-	-	-	-	+	+	+	+	+	-	+	+	-	+	-
10	Oriental Scops- Owl	-	+	-	-	-	+	-	-	-	-	-	-	-	+	-	+	-	-	-	-
11	Brown Wood-Owl	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-
12	Spot-bellied-Eagle Owl	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
13	Collared Scopes- Owl	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Short- eared Owl	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-

List of owls and owlets of Odisha state studied during the survey period.

	Scientific name	Common name	Habitat	Feeding habit	Abundance	IUCN Red List status
1.	*Athene brama* (Temminck, 1821)	Spotted Owlet	Agricultural fields close to human habitation	Insects, rodents, small birds	C	LC
2.	*Otus bakkamoena* (Pennant, 1769)	Indian Scops-Owl	Peripheral region of the forest area close to agricultural fields	Insects, rodents, lizards, small birds	C	LC
3	*Tyto alba* (Scopoli, 1769)	Common Barn Owl	Outskirts of human habitation & close to agricultural fields	Rodents, small birds, small mammals	C	LC
4.	*Glaucidium radiatum* (Tickell, 1833)	Jungle Owlet	Close forest area away from human habitation	Insects, rodents, small birds	C	LC
5.	*Ketupa zeylonensis* (Gmelin, 1788)	Brown Fish-Owl	Close forest areas near water bodies	Fishes, frogs, birds, small mammals	UC	LC
6.	*Bubo coromandus* (Latham, 1790)	Dusky Eagle-Owl	Close forest areas near coastal reasons	Small mammals, birds, fishes, frogs	UC	LC
7.	*Bubo bengalensis* (Franklin, 1831)	Indian Eagle-Owl	Rocky cliffs near water bodies	Small mammals, birds, fishes	UC	LC
8.	*Ninox scutulata* (Raffles, 1822)	Brown Hawk-Owl	Dense forest areas away from human settlement	Insects, small mammals, frogs, lizards	UC	LC
9.	*Strix ocellata* (Lesson, 1839)	Mottled Wood-Owl	Dense forest areas away from human settlement	Small mammals, birds, frogs, lizards	UC	LC
10.	*Otus sunia* (Hodgson, 1836)	Oriental Scops-Owl	Dense forest areas away from human settlement	Insects, small birds, frogs, lizards	UC	LC
11.	*Strix leptogrammica* Temminck, 1831	Brown Wood-Owl	Dense forest areas away from human settlement	Small mammals, birds, reptiles	UC	LC
12.	*Bubo nipalensis* Hodgson, 1836	Spot- bellied Eagle-Owl	Dense forest areas away from human settlement	Small mammals, birds, reptile	UC	LC
13.	*Otus lettia* Hodgson, 1836	Collared Scops-Owl	Dense forest and mangrove areas away from human settlement	Small mammals, rodents, birds, reptiles	UC	LC
14.	*Asio flammeus* (Pontoppidan, 1763)	Short-eared Owl	Grassland areas away from human settlement	Small mammals, birds, reptile	UC	LC

C—Common | UC—Uncommon | LC—Least Concern.



a—Spotted Owlet | b—Indian Scops-Owl | c—Common Barn Owl | d—Jungle Owlet | e—Brown Fish-Owl | f—Dusky Eagle-Owl | g—Collared Scops-Owl | h—Indian Eagle-Owl | i—Brown Hawk-Owl | j—Mottled Wood-Owl | k—Oriental Scops-Owl | l—Brown Wood-Owl | m—Spot -bellied Eagle-Owl | n—Short-eared Owl.

individuals that can be considered surplus. They catch weaker members of a population that are easiest to catch and least able to cope with the surrounding environment. In doing so, they help maintain the health and viability of prey populations. Owls have many direct and indirect utilitarian values (e.g., ecosystem services and benefits); recreational and aesthetic values (natural beauty, parks and natural reserves); intrinsic, spiritual, and ethical values. A strong step for the better conservation of these beautiful birds of prey is the need of the hour.

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