



Tamil Nadu State-wide Raptor Assessment

31st Jan & 01st Feb - 2026



**TECHNICAL
REPORT**

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TAMIL NADU RAPTOR RESEARCH FOUNDATION (TNRRF)

Advanced Institute for Wildlife Conservation (AIWC) (Research, Training & Education),
Vandalur, Chennai-600 048, Tamil Nadu, India

Oriental Honey Buzzard
Pernis ptilorhynchus



ACKNOWLEDGEMENT

This successful implementation of the first-ever synchronized State-wide Raptor Assessment in India was made possible through the collective efforts and unwavering commitment of the Tamil Nadu Forest Department personnel. We express our sincere gratitude to the Principal Chief Conservator of Forests (Head of Forest Force), Tamil Nadu, and the Principal Chief Conservator of Forests & Chief Wildlife Warden, Tamil Nadu, for extending institutional support for this landmark initiative.

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This assessment stands as a testament to the strength of collaborative conservation efforts and reflects the collective vision of the Tamil Nadu Government towards advancing raptor research, monitoring, and conservation in the state.

~Tamil Nadu Raptor Research Foundation

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ABBREVIATIONS

AIWC	-----	Advanced Institute for Wildlife Conservation
ATR	-----	Anamalai Tiger Reserve
CR	-----	Critically Endangered
EN	-----	Endangered
IUCN	-----	International Union for Conservation of Nature
KMTR	-----	Kalakkad Mundanthurai Tiger Reserve
Km	-----	Kilometer
Hr	-----	Hour
MTR	-----	Mudumalai Tiger Reserve
NTCA	-----	National Tiger Conservation Authority
NT	-----	Near Threatened
LC	-----	Least Concern
RAI	-----	Relative Abundance Index
RI	-----	Rarity Index
R,T,& E	-----	Research, Training & Education
SoIB	-----	State of Indian Birds
STR	-----	Sathyamangalam Tiger Reserve
TNFD	-----	Tamil Nadu Forest Department
TNRRF	-----	Tamil Nadu Raptors Research Foundation
ToT	-----	Training of Trainers
VU	-----	Vulnerable

1. INTRODUCTION

The establishment of the Tamil Nadu Raptor Research Foundation (TNRRF) is one of the State Government's flagship initiatives to conserve avian raptors, a group considered vital environmental indicators. The Tamil Nadu Raptor Research Foundation was announced on 14.03.2025. Following the announcement, the TNRRF was established on 02.09.2025 and housed at the Advanced Institute for Wildlife Conservation (AIWC).

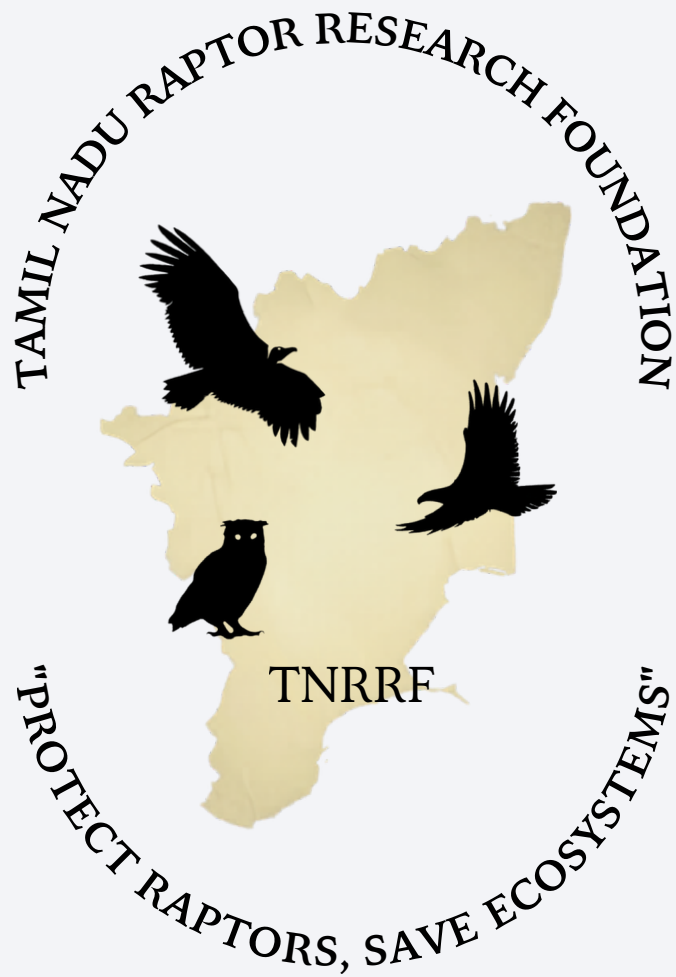
The foundation is envisioned with five core objectives centred on raptors:

- (i) Research and monitoring,
- (ii) Education and awareness,
- (iii) Capacity building and training,
- (iv) Conservation and habitat management, and
- (v) Collaboration and networking.

A State committee with forest department officials & Expert members was constituted, and the first meeting of the committee was held at AIWC on 02 September 2025. During this meeting, it was resolved to undertake an annual State-wide raptor assessment to understand and monitor the distribution pattern and relative abundance of raptors in Tamil Nadu. Further, a detailed work plan was drafted, including standardised methodologies and sampling protocols. To execute this assessment, each forest division was treated as a functional unit for field data collection.



2. OBJECTIVES



Establish baseline data for
long-term monitoring

1

2

To identify the hotspots of raptors

To demarcate their current distribution
across the State

3



3. METHODOLOGY

3.1. STUDY AREA

Tamil Nadu, a State of India with a geographical area of $\sim 1,30,060 \text{ km}^2$ between Latitude: $08^{\circ}05' \text{ N}$ to $13^{\circ}35' \text{ N}$ and Longitude: $76^{\circ}15' \text{ E}$ to $80^{\circ}20' \text{ E}$, is the 6th largest State in India. The State can be broadly recognised into two unique biogeographic zones of India: (i) the Coastal plains of South India and (ii) the hilly Western Ghats. The vast land within the State can be ecologically recognised as (i) Coromandel plains comprising the districts of Kancheepuram, Tiruvallur, Cuddalore and Vellore, (ii) The plains of alluvial Cauvery Delta extending over Thanjavur and part of Tiruchirappalli districts and (iv) dry southern plains in Madurai, Dindigul, Ramanathapuram, Sivagangai, Virudhunagar, Tirunelveli and Tuticorin districts (Fig. 01).

In ancient literature, Tamil Nadu is broadly classified into five biomes: Kurinji (Mountains), Mullai (Forests), Marutham (Cropland), Neithal (Sea & Shore), and Palai (Desert). Currently, the State is administered by 51 territorial forest divisions (Fig. 02) and 38 districts (Fig. 03).

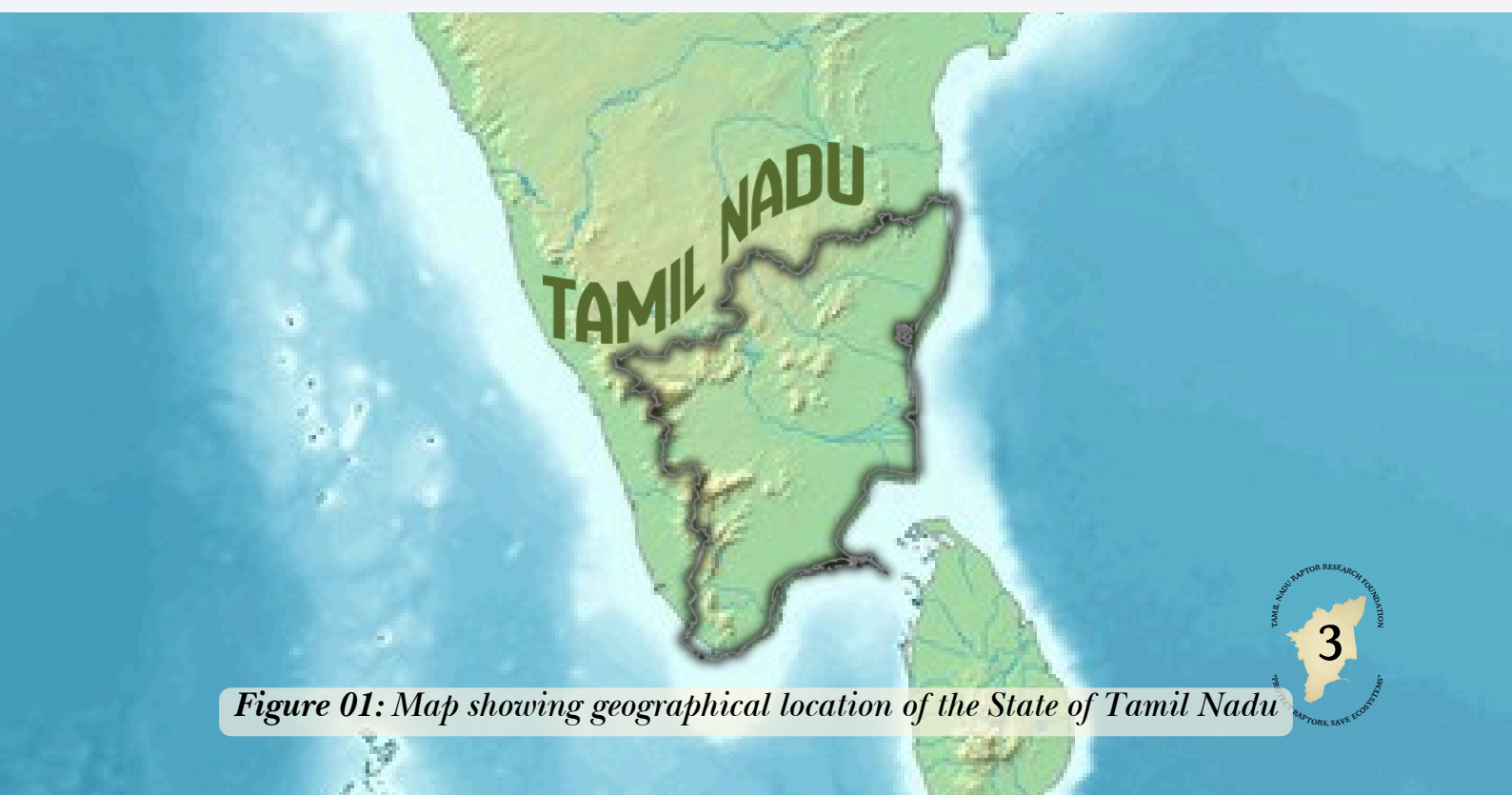


Figure 01: Map showing geographical location of the State of Tamil Nadu

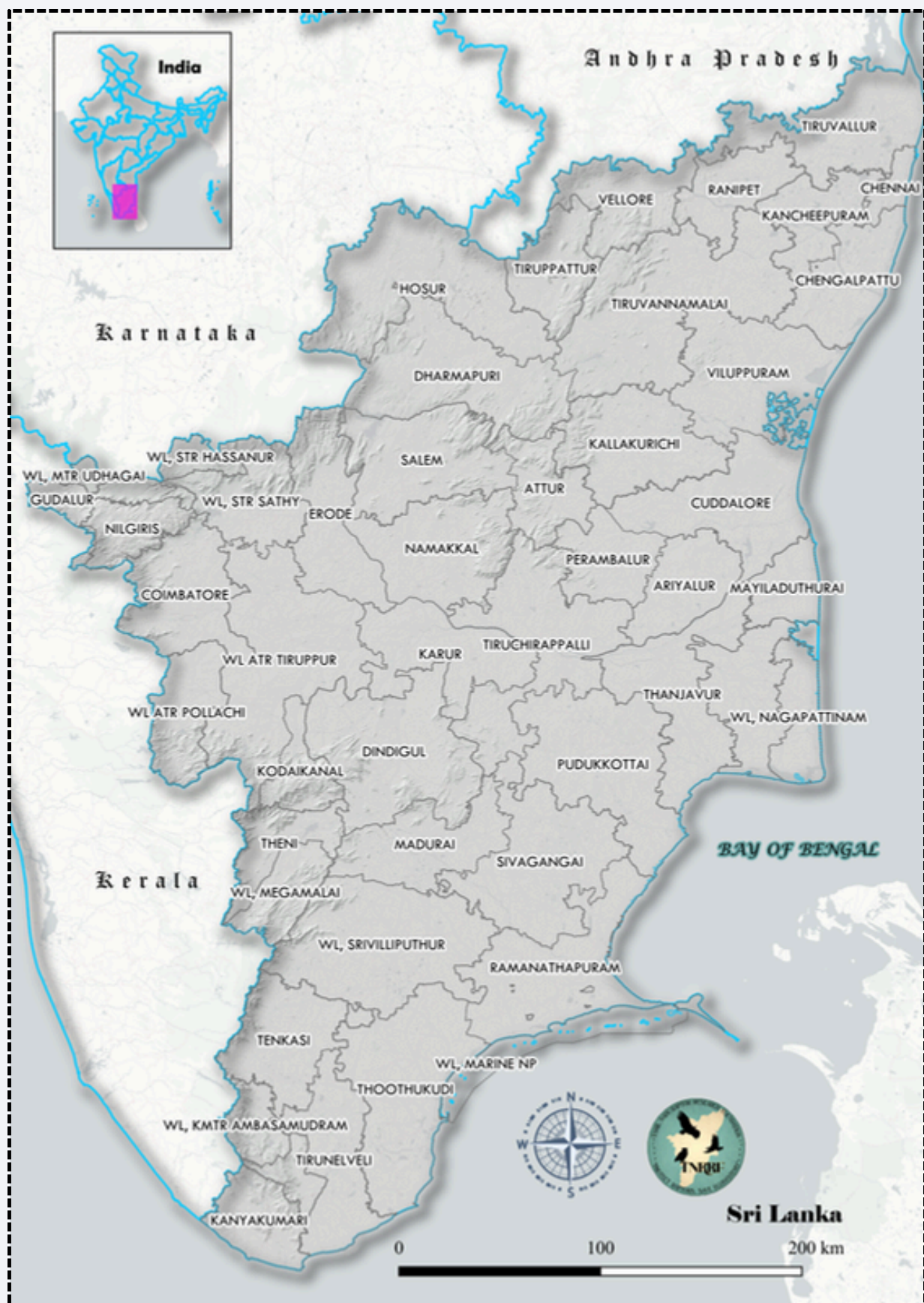


Figure 02: Map showing forest divisions of Tamil Nadu

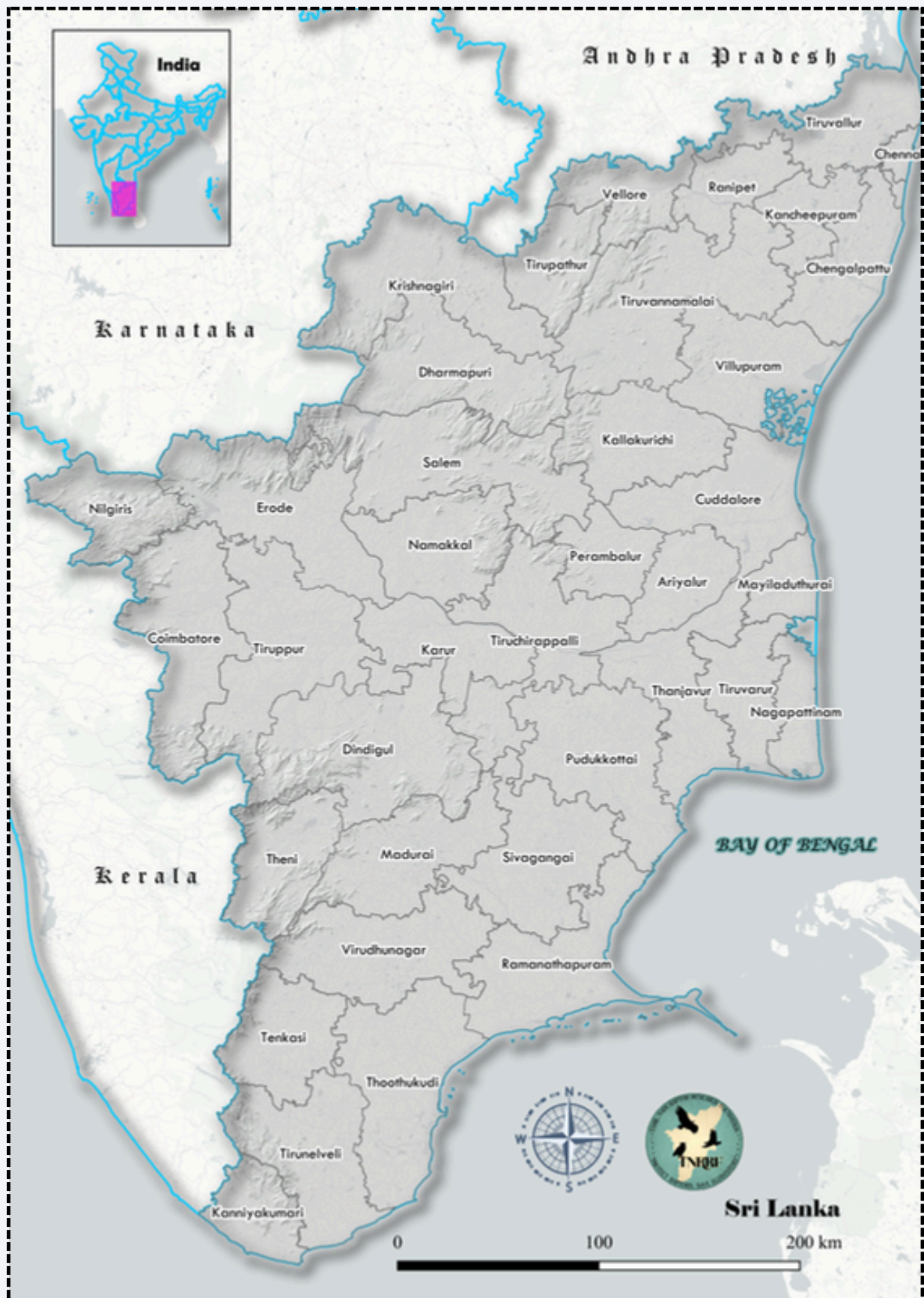


Figure 03: Map showing districts of Tamil Nadu

3.2. OVERVIEW OF RAPTORS IN TAMIL NADU

Observations from the last three years (2022 - 2025) of the synchronised bird census of Tamil Nadu and the citizen science platform indicate 67 confirmed records of raptor species within the State's administrative boundaries. Raptors found in Tamil Nadu are usually distributed at low densities over extensive areas because of their diverse traits and large home-range requirements, and the home range of each species differs based on dietary requirements and other life-history traits (Fig 04).

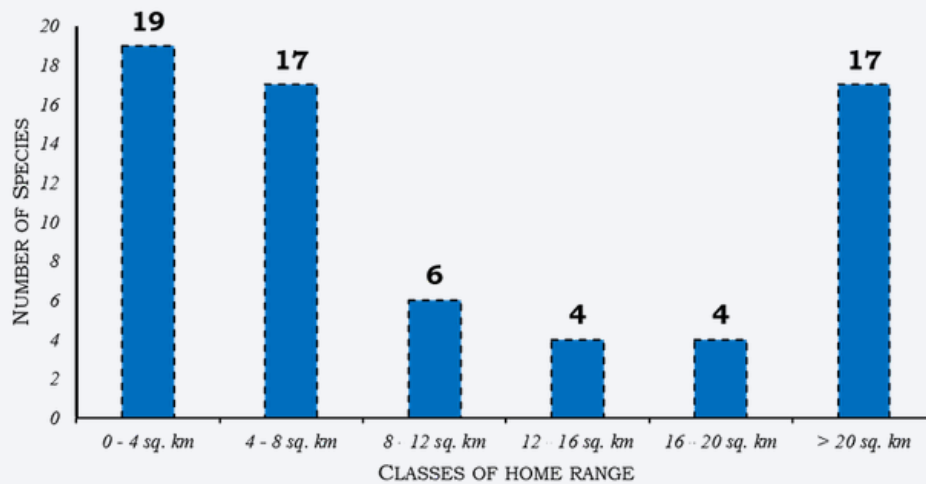


Figure 04: *Raptor species diversity with different home range requirements*

Additionally, every species is unique in its habitat association (Fig. 05) and hunting strategy; unlike other birds, certain raptor species exhibit nocturnal activity patterns. In Tamil Nadu, 14 species are nocturnal, which is 21% of the entire raptor population. All these factors, along with the species' global rarity according to IUCN status, make studying all the raptors in a large landscape like Tamil Nadu State quite challenging. After considering the experts' opinions and an extensive review, we developed the following scheme to study and monitor raptors in Tamil Nadu.

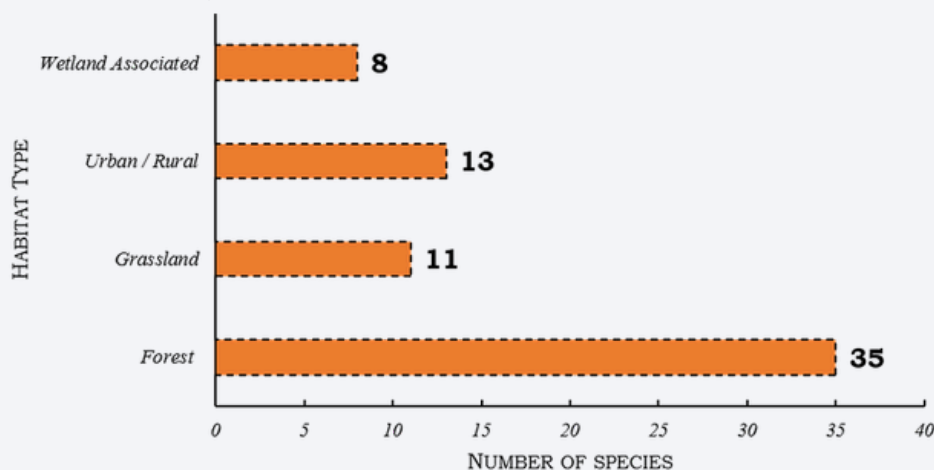


Figure 05: *Raptor species diversity with different habitat type requirements*

3.3. SAMPLING DESIGN

Because of the larger study area (Entire State $\sim 1,30,060 \text{ km}^2$), logistical challenges, and the relatively limited number of raptor identification experts in the State, it is determined that total-area sampling, along with a synchronised sampling protocol, is impractical. So, the Priority block sampling procedure was considered for this assessment, as it is feasible to follow for long-term monitoring of the raptor population and to determine population trends in Tamil Nadu.

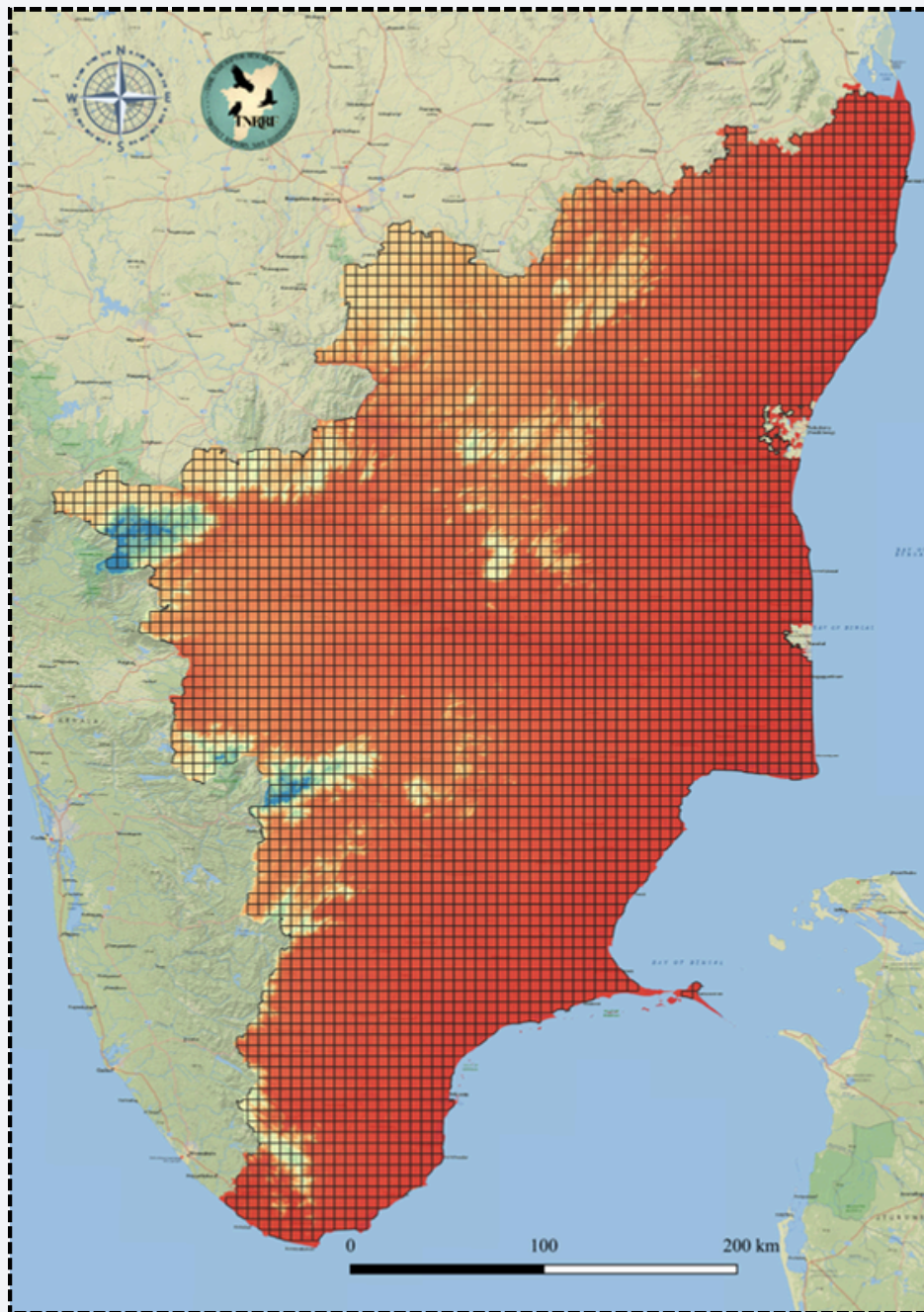


Figure 06: Map showing the blocks of $\sim 32 \text{ km}^2$ for the State of Tamil Nadu

3.4. SAMPLING FRAME WORK

The entire land area of Tamil Nadu was overlaid with $\sim 32 \text{ km}^2$ ($5.656 \text{ km} \times 5.656 \text{ km}$) spatial grids using a geographical information system (Fig. 06). These are considered as sampling blocks. This block dimension of ($5.656 \text{ km} \times 5.656 \text{ km}$) is fixed to match the National Tiger Conservation Authorities' (NTCA) grid size for monitoring faunal diversity in Tiger Reserves of India.

The chosen block sampling design has its own following advantages,

1. Consistent & robust design to achieve long-term monitoring and to know Raptor population dynamics (including both migratory and resident species).
2. Facilitates the estimation of population sizes for each species within a well-defined area, thus allowing comparisons of populations either spatially or temporally.
3. Grids will reduce bias in homogeneous habitat sampling.
4. Grids will facilitate the description of distribution patterns and hotspots.

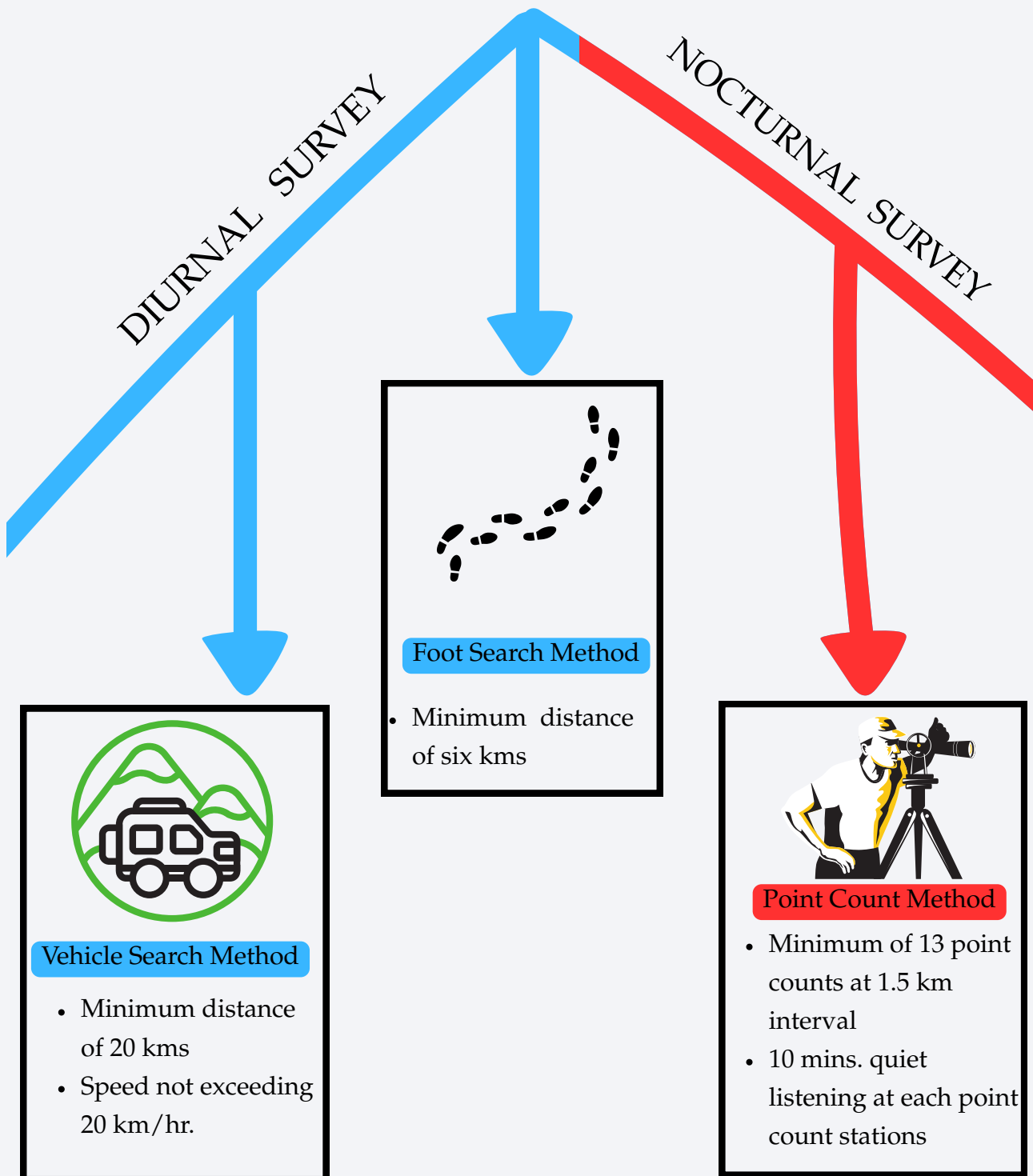
3.5. SAMPLE SIZE

After eliminating the blocks with inadequate area to sample ($< 20 \text{ km}^2$) the State of Tamil Nadu had over 4067 blocks for sample selection. To achieve a uniform, unbiased sampling distribution across the State, each forest division selected 10% of the blocks within its judicial boundary as sampling blocks. In a way, 49 out of 51 forest divisions of Tamil Nadu had become functional units for this assessment. Adhering to this approach, $\sim 10\%$ of the State's total land area ($\sim 13,006 \text{ km}^2$) was targeted for sampling raptor species. The selection of the blocks was carried out based on the following three important criteria;

- i. Adjacent or consecutive blocks not to be selected
- ii. The selected blocks required to represent all the major habitat types, if present (i.e., Grasslands, Shore, Forest, Wetlands, Paddy, Agriculture land, Waste land, Plantations, multiple rural habitations, etc.), are present within the division.
- iii. The blocks require multiple road access to facilitate vehicle movement and conduct the survey. In that way, clustering of sampling effort was avoided.

3.6. SAMPLING PROCEDURE

Two sampling sessions were carried out to document the raptors of Tamil Nadu: evening (18:00 – 21:00 hrs) for nocturnal raptors and morning (8:00 - 12:00 hrs) for diurnal raptors. An Android-based mobile application, “*Locus Outdoor*,” was used in the field to visualise survey blocks and create transects and point counts.



3.7. TRAINING

A Training of Trainers (ToT) programme was conducted at AIWC on 23.12.2025, with 56 officials from the Tamil Nadu Forest Department, and department representatives in attendance (Fig. 07). The master trainers were provided with training materials, species identification materials, and standardised datasheets to encourage them to conduct division-level training programs for field coordinators, who would be responsible for conducting raptor assessments at the field level. The training of the field coordinators was conducted at the forest division level on 31st Jan 2026, followed by the raptor assessment conducted in two phases: the nocturnal survey on 31st Jan 2026 using the Point Count method, followed by the diurnal survey on 1st Feb 2026 using two area search methods, namely Vehicle Search and Foot Search. Based on the collected data, this technical report presents insights into the occurrence and distribution patterns of raptors in Tamil Nadu. In the sighting records of relatively rare birds without photographs, care was taken to double-check species identification by discussing it with the observer(s).

Figure 07: Group discussion on the event of Training of Trainers at AIWC



4. RESULTS

4.1. SAMPLING ACHIEVEMENT



31 Jan 2026 - Nocturnal Survey
&
01 Feb 2026 - Diurnal Survey



49 Forest Divisions involved



389 Blocks were sampled

Equivalent to approximately 12,448 sq. km or 9.57% of the State's land area (Fig. 08).



3,643 People participated

1509 persons - Nocturnal; 1143 persons - Vehicle Survey;
991 persons - Foot Survey

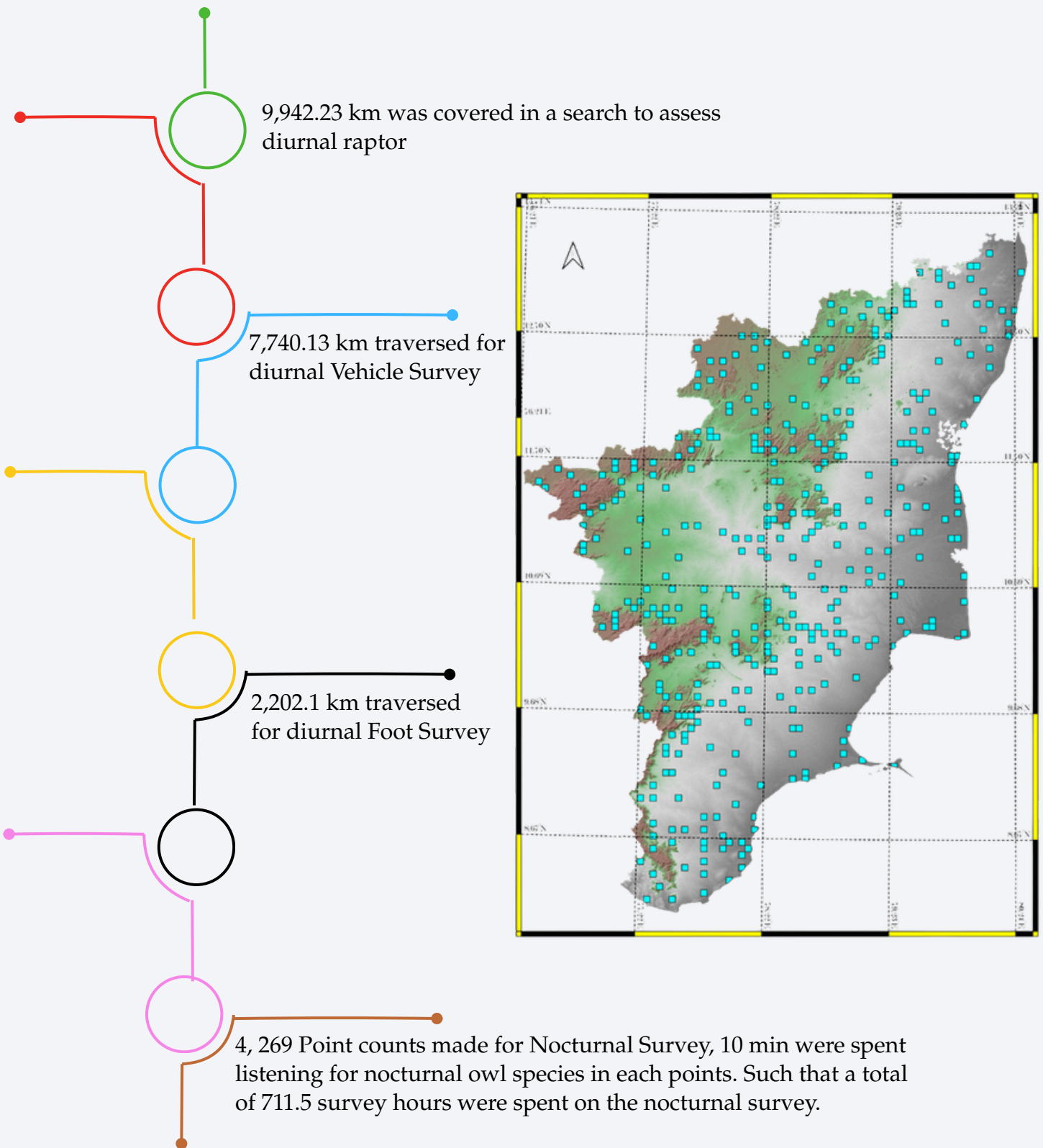


Figure 08: Map showing the sampling blocks selected for the raptor assessment 2025-2026

Table 01: Sampling effort given by forest divisions of Tamil Nadu

Sl. No	Circle	Divisions	No. of Blocks Surveyed	Effort (Person -Day)*	No. of Nocturnal Point Counts	Vehicle Search (Kms)	Foot Search (Kms)
1	Chennai	Chengalpattu	6	64	83	126.77	38.19
2		Chennai	2	39	17	42.2	16.2
3		Kancheepuram	4	61	54	77.73	5.56
4		Tiruvallur	10	59	124	219.81	67.92
5	Salem	Attur	5	24	65	113.3	23.5
6		Namakkal	10	135	86	194.7	68.7
7		Salem	11	53	129	206	46.7
8	Trichy	Ariyalur	6	31	79	129.9	30
9		Mayiladuthurai	4	95	32	43.85	0
10		Nagapattinam	4	139	35	79.5	24
11		Perambalur	6	94	77	109.3	21
12		Pudukkottai	15	41	194	293.52	103.22
13		Thanjavur	11	44	138	218.8	69.5
14		Tiruchirappalli	14	102	33	272.1	69.75
15		Tiruvarur	4	108	49	80	16.4
16	ATR, Coimbatore	Coimbatore	9	35	85	170.9	58.8
17		Pollachi	5	24	38	96	19
18		Tiruppur	17	203	205	360.9	101.4
19	Dharmapuri	Dharmapuri	12	138	168	241.5	72.93
20		Hosur	16	168	191	295.7	97.1
21	Dindigul	Dindigul	15	26	61	168.9	46.2
22		Karur	8	74	102	177.8	54
23		Kodaikanal	4	68	54	79.75	24.63
24	KMTR, Tirunelveli	Ambasamudram	3	48	39	66	18.5
25		Kalakkad	2	111	27	41	11.4
26		Kanniyakumari	5	122	60	100.7	33.1
27		Tenkasi	8	35	54	146	23
28		Thoothukudi	15	64	145	299.2	71.5
29		Tirunelveli	9	123	114	201.5	57.6
30	SMTR, Madurai	Madurai	9	15	87	225	58.8
31		Megamalai	4	15	50	71.7	26.2
32		Ramnathapuram	13	81	158	265.7	77.3
33		Sivagangai	13	30	152	275.2	82.1
34		Srivilliputhur	17	70	170	390.1	91.6
35		Theni	4	34	51	79.9	32.8
36	MTR, Ooty	Gudalur	2	95	36	44	10
37		Masinagudi	2	93	26	35	13.1
38		Nilgiris	4	22	52	75	26.2
39		Udhagai	1	32	6	25	6
40	Vellore	Ranipet	6	50	64	96.4	41.9
41		Tirupathur	6	170	70	111.7	37
42		Tiruvannamalai	12	107	150	264.9	69.9
43		Vellore	7	33	65	113.8	37.8
44	STR, Erode	Erode	9	109	110	195.4	53.4
45		Hassanur	2	57	19	40	12.3
46		Sathyamangalam	7	77	65	141.4	35.1
47	Viluppuram	Cuddalore	9	24	113	189.1	56.2
48		Kallakurichi	10	66	156	187.2	66.3
49		Viluppuram	12	135	131	260.3	78.3
			389	3643	4269	7740.13	2202.1

* The effort (person-day) reflects the sum of people involved in three independent assessment protocol. One person might involved in more than one assessment protocol. And also the group includes both volunteers and forest department staff.

4.2. SPECIES RECORDS

A total of 3867 independent sightings were made during the assessment across Tamil Nadu. Including all three sampling protocols, resulting in the logging of 5644 individual raptors. The sightings comprised 51 raptor species (Table 02), including 40 diurnal and 11 nocturnal species. Due to various factors, 296 individual raptors were recorded as unidentified at the field level. Some were identified up to genus level (11 – Buteo spp., 6 – Circus spp., 1 – Aquila spp., 24 – Falco spp., 11 – Kite spp., 35 as Eagles, and 12 as Owls.

40
Species

Diurnal

11
Species

Nocturnal



Largest and smallest raptors recorded in diurnal and nocturnal survey



Table 02: List of raptor species recorded in the assessment

SN	Order	Family	English Name	Scientific Name	Common Sub-class
1	Accipitriformes	Pandionidae	Osprey	<i>Pandion haliaetus</i>	Osprey
2	Accipitriformes	Accipitridae	Black Kite	<i>Milvus migrans</i>	Kite
3	Accipitriformes	Accipitridae	Brahminy Kite	<i>Haliastur indus</i>	Kite
4	Accipitriformes	Accipitridae	Black-winged Kite	<i>Elanus caeruleus</i>	Kite
5	Accipitriformes	Accipitridae	Egyptian Vulture*	<i>Neophron percnopterus</i>	Vulture
6	Accipitriformes	Accipitridae	Red-headed Vulture	<i>Sarcogyps calvus</i>	Vulture
7	Accipitriformes	Accipitridae	White-rumped Vulture	<i>Gyps bengalensis</i>	Vulture
8	Accipitriformes	Accipitridae	Indian Vulture	<i>Gyps indicus</i>	Vulture
9	Accipitriformes	Accipitridae	White-eyed Buzzard	<i>Butastur teesa</i>	Buzzard
10	Accipitriformes	Accipitridae	Common Buzzard	<i>Buteo buteo</i>	Buzzard
11	Accipitriformes	Accipitridae	Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	Honey-buzzard
12	Accipitriformes	Accipitridae	Crested Serpent-Eagle	<i>Spilornis cheela</i>	Eagle
13	Accipitriformes	Accipitridae	Short-toed Snake-Eagle	<i>Circus gallicus</i>	Eagle
14	Accipitriformes	Accipitridae	Rufous-bellied Eagle	<i>Lophotriorchis kienerii</i>	Eagle
15	Accipitriformes	Accipitridae	Black Eagle	<i>Ictinaetus malaiensis</i>	Eagle
16	Accipitriformes	Accipitridae	Indian Spotted Eagle	<i>Clanga hastata</i>	Eagle
17	Accipitriformes	Accipitridae	Greater Spotted Eagle	<i>Clanga clanga</i>	Eagle
18	Accipitriformes	Accipitridae	Booted Eagle	<i>Hieraaetus pennatus</i>	Eagle
19	Accipitriformes	Accipitridae	Steppe Eagle	<i>Aquila nipalensis</i>	Eagle
20	Accipitriformes	Accipitridae	Tawny Eagle	<i>Aquila rapax</i>	Eagle
21	Accipitriformes	Accipitridae	Bonelli's Eagle	<i>Aquila fasciata</i>	Eagle
22	Accipitriformes	Accipitridae	White-bellied Sea-Eagle	<i>Ichthyophaga leucogaster</i>	Eagle
23	Accipitriformes	Accipitridae	Lesser Fish-Eagle	<i>Ichthyophaga humilis</i>	Eagle
24	Accipitriformes	Accipitridae	Grey-headed Fish-Eagle*	<i>Ichthyophaga ichthyaetus</i>	Eagle
25	Accipitriformes	Accipitridae	Crested Goshawk	<i>Lophospiza trivirgata</i>	Hawk
26	Accipitriformes	Accipitridae	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	Hawk
27	Accipitriformes	Accipitridae	Legge's Hawk-Eagle	<i>Nisaetus kelaarti</i>	Hawk-Eagle
28	Accipitriformes	Accipitridae	Changeable Hawk-Eagle	<i>Nisaetus cirrhatus</i>	Hawk-Eagle
29	Accipitriformes	Accipitridae	Western Marsh Harrier	<i>Circus aeruginosus</i>	Harrier
30	Accipitriformes	Accipitridae	Eastern Marsh Harrier	<i>Circus spilonotus</i>	Harrier
31	Accipitriformes	Accipitridae	Pallid Harrier	<i>Circus macrourus</i>	Harrier
32	Accipitriformes	Accipitridae	Pied Harrier	<i>Circus melanoleucos</i>	Harrier
33	Accipitriformes	Accipitridae	Montagu's Harrier	<i>Circus pygargus</i>	Harrier
34	Accipitriformes	Accipitridae	Besra	<i>Tachyspiza virgata</i>	Besra
35	Accipitriformes	Accipitridae	Shikra	<i>Tachyspiza badia</i>	Shikra
36	Accipitriformes	Accipitridae	Black Baza	<i>Aviceda leuphotes</i>	Baza
37	Falconiformes	Falconidae	Red-necked Falcon	<i>Falco chicquera</i>	Falcon
38	Falconiformes	Falconidae	Peregrine Falcon	<i>Falco peregrinus</i>	Falcon
39	Falconiformes	Falconidae	Lesser Kestrel	<i>Falco naumanni</i>	Kestrel
40	Falconiformes	Falconidae	Common Kestrel	<i>Falco tinnunculus</i>	Kestrel
41	Strigiformes	Tytonidae	Eastern Barn Owl	<i>Tyto javanica</i>	Owl
42	Strigiformes	Strigidae	Indian Scops-Owl	<i>Otus bakkamoena</i>	Owl
43	Strigiformes	Strigidae	Oriental Scops-Owl	<i>Otus sunia</i>	Owl
44	Strigiformes	Strigidae	Brown Boobook	<i>Ninox scutulata</i>	Boobook
45	Strigiformes	Strigidae	Indian Eagle-Owl	<i>Bubo bengalensis</i>	Owl
46	Strigiformes	Strigidae	Brown Fish-Owl	<i>Ketupa zeylonensis</i>	Owl
47	Strigiformes	Strigidae	Spot-bellied Eagle-Owl	<i>Ketupa nipalensis</i>	Owl
48	Strigiformes	Strigidae	Mottled Wood-Owl	<i>Strix ocellata</i>	Owl
49	Strigiformes	Strigidae	Brown Wood-Owl	<i>Strix leptogrammica</i>	Owl
50	Strigiformes	Strigidae	Jungle Owlet	<i>Glaucidium radiatum</i>	Owlet
51	Strigiformes	Strigidae	Spotted Owlet	<i>Athene brama</i>	Owlet

* The identification of this species only from the field description by the observer(s). Underpart photographic evidence submitted for this species not satisfied the diagnostic character of the white upper-tail of this species in contra with extended brown upper-tail coverts of Lesser Fish Eagle.

The record of this species only from the field description by the observer(s), but not supported photographic evidence.

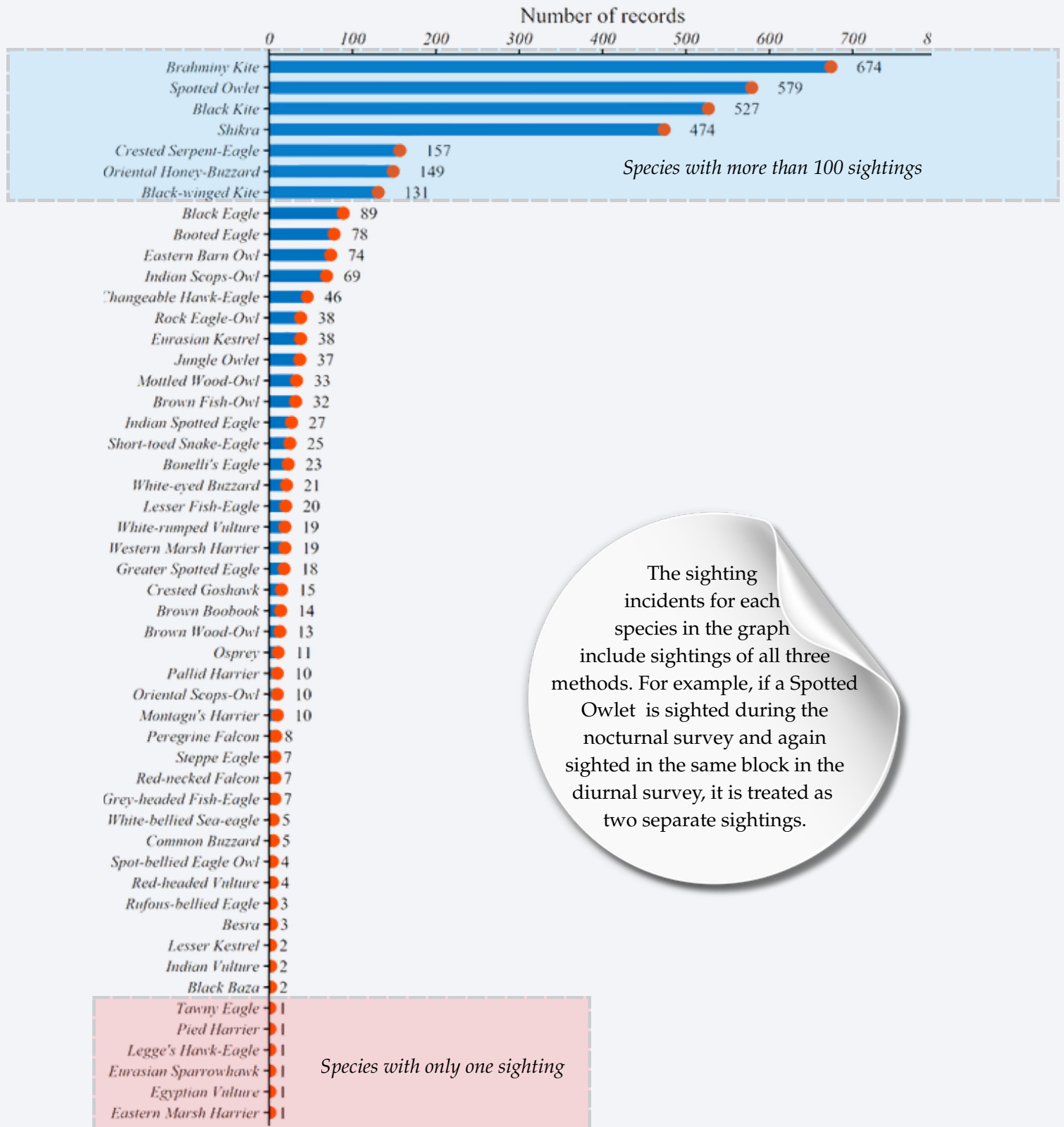


Figure 09: Graph showing the number of sightings of identified 51 species

Species with single sightings were also observed to be rare and classified as high conservation priority due to their rapid decline across India (SoIB 2023), except for Eurasian Sparrowhawk. The later species, commonly found elsewhere in India and with no habitat specialisation recorded, is found only once in Tamil Nadu.

4.3. ENCOUNTER RATE OF RAPTORS

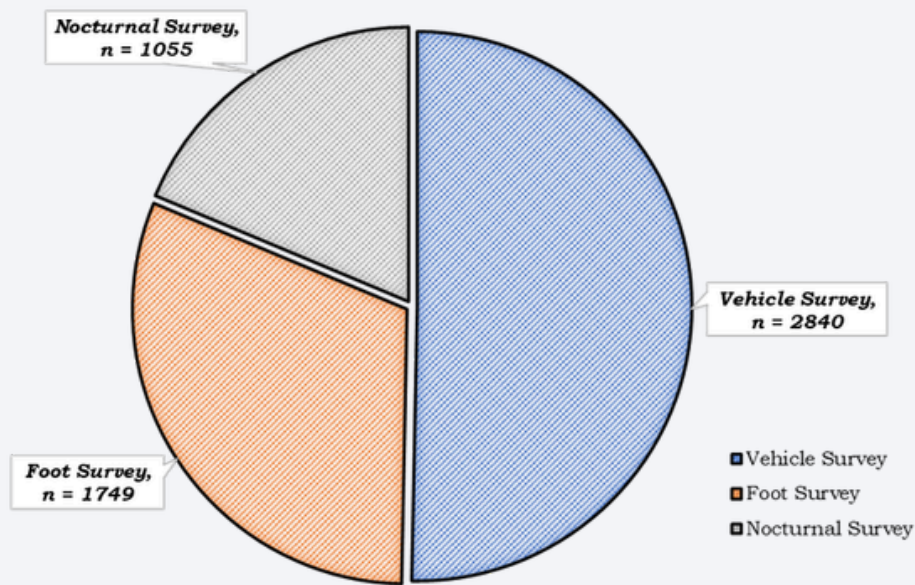


Figure 10: Number of individual raptor sightings under three survey methods

Nearly 7740.13 km and 2202.1 km were travelled for the vehicle survey and foot survey, respectively, and approximately 711.5 hr of listening time were spent on the nocturnal raptor survey. The vehicle survey recorded a large population of raptors (Fig. 10). However, given the effort (distance covered), the foot survey had a higher encounter rate than the vehicle survey. For the nocturnal raptor survey, approximately 40 minutes were spent to detect one nocturnal raptor (Table 03).

Table 03: Abundance of raptors with respect to sampling method and the unit effort spent to detect one independent sighting

Survey type	Number of individual Raptor	No. Individual raptor / unit effort	Effort to detect one any one detection of a raptor
Vehicle Survey	2840	0.37/km	2.73km/detection
Foot Survey	1749	0.79/km	1.26km/detection
Nocturnal Survey	1055	1.48/hr	0.67hr/detection

4.4. RELATIVE ABUNDANCE OF RAPTORS

The survey methods we used for this State-wide assessment (Road-based transect surveys) are widely used for monitoring raptor populations across large spatial scales elsewhere. However, such methods are subject to biases, including imperfect detection and potential double-counting due to individual movement. Therefore, counts derived from these surveys should be interpreted as indices of relative abundance rather than as absolute population estimates. Despite these limitations, relative abundance indices are considered robust for comparing species composition, spatial variation, and temporal trends when survey efforts are standardised (Bibby et al., 2000)^[2].

So, for this assessment, the species relative abundance index (RAI) of each species with respect to all surveyed blocks together was calculated in this study using the method developed by Woffinden and Murphy (1977)^[1] for each raptor species sighted:

$$\text{Effort Standardised Relative Index (RA}_i\text{)} = \frac{n_i}{\sum \text{effort}} \times 1000$$

Where:

n_i = count of species i

$\sum \text{effort}$ = distance travelled or hours spent

Out of the total recorded species, Brahminy Kite (30.99 %), Black Kite (24.33 %), and Shikra (11.94 %) accounted for 67.2% of the individual raptors sighted in vehicle survey (Table 04) and 66.6% (Brahminy Kite-31.90%, Black Kite-22.81%, and Shikra-11.89%) in diurnal foot survey (Table 05). Whereas in the nocturnal raptor survey, the Spotted Owlet alone contributed 55.7% with respect to other species, and another 11.09% of the nocturnal raptor records were unidentified (Table 06).

Surprisingly in both survey methods targeted for diurnal raptors, owls were also recorded in quantifiable numbers. Five species of owls in the foot survey accounted for 4.68% and 6 species of owls in the vehicle search accounted for 3.45% (Table 04 & 05). These records may have resulted from targeted call playback during survey hours.

Table 04: Relative abundance of raptors recorded in vehicle survey

Species	Number observed	Index of relative abundance	Km required to detect one individual raptor
Brahminy Kite	880	113.69	8.80
Black Kite	691	89.27	11.20
Shikra	339	43.80	22.83
Oriental Honey-buzzard	116	14.99	66.73
Crested Serpent-Eagle	105	13.57	73.72
Black-winged Kite	101	13.05	76.63
Spotted Owlet	66	8.53	117.27
Black Eagle	59	7.62	131.19
Booted Eagle	55	7.11	140.73
Unknown Sp.	51	6.59	151.77
Eagle spp.	44	5.68	175.91
Changeable Hawk-Eagle	30	3.88	258.00
Eurasian Kestrel	29	3.75	266.90
White-rumped Vulture	27	3.49	286.67
Indian Spotted Eagle	18	2.33	430.01
White-eyed Buzzard	18	2.33	430.01
Bonelli's Eagle	15	1.94	516.01
Falco spp.	15	1.94	516.01
Buteo spp.	14	1.81	552.87
Short-toed Snake-Eagle	14	1.81	552.87
Greater Spotted Eagle	12	1.55	645.01
Western Marsh Harrier	11	1.42	703.65
Kite spp.	10	1.29	774.01
Lesser Fish-Eagle	10	1.29	774.01
Pallid Harrier	10	1.29	774.01
Crested Goshawk	8	1.03	967.52
Jungle Owlet	7	0.90	1105.73
Osprey	7	0.90	1105.73
Owl spp.	7	0.90	1105.73
Steppe Eagle	7	0.90	1105.73
Brown Fish-Owl	6	0.78	1290.02
Common Buzzard	5	0.65	1548.03
Grey-headed Fish-Eagle	5	0.65	1548.03
Red-necked Falcon	5	0.65	1548.03
Rock Eagle-Owl	5	0.65	1548.03
White-bellied Sea-eagle	5	0.65	1548.03
Montagu's Harrier	4	0.52	1935.03
Peregrine Falcon	3	0.39	2580.04
Red-headed Vulture	3	0.39	2580.04
Harrier spp.	3	0.39	2580.04
Besra	2	0.26	3870.07
Brown Wood-Owl	2	0.26	3870.07
Circus spp.	2	0.26	3870.07
Eastern Barn Owl	2	0.26	3870.07
Indian Vulture	2	0.26	3870.07
Lesser Kestrel	2	0.26	3870.07
Mottled Wood-Owl	2	0.26	3870.07
Rufous-bellied Eagle	2	0.26	3870.07
Black Baza	1	0.13	7740.13
Egyptian Vulture	1	0.13	7740.13
Indian Scops-Owl	1	0.13	7740.13
Legge's Hawk-Eagle	1	0.13	7740.13
Total	2840		

Table 05: Relative abundance of raptors recorded in foot survey

Species	Number observed	Index of relative abundance	Km required to detect one individual raptor
Brahminy Kite	558	253.05	3.95
Black Kite	399	180.94	5.53
Shikra	208	94.33	10.60
Crested Serpent-Eagle	80	36.28	27.56
Oriental Honey-buzzard	62	28.12	35.57
Spotted Owlet	56	25.40	39.38
Black-winged Kite	44	19.95	50.12
Black Eagle	40	18.14	55.13
Booted Eagle	30	13.60	73.50
Eagle spp.	30	13.60	73.50
Unknown Sp.	28	12.70	78.75
Changeable Hawk-Eagle	19	8.62	116.06
Lesser Fish-Eagle	16	7.26	137.82
Short-toed Snake-Eagle	14	6.35	157.51
Indian Spotted Eagle	13	5.90	169.62
Western Marsh Harrier	13	5.90	169.62
Eurasian Kestrel	12	5.44	183.76
White-rumped Vulture	12	5.44	183.76
Bonelli's Eagle	10	4.53	220.51
Owl spp.	9	4.08	245.01
Falco spp.	9	4.08	245.01
Greater Spotted Eagle	8	3.63	275.64
Brown Fish-Owl	7	3.17	315.01
Crested Goshawk	7	3.17	315.01
Rock Eagle-Owl	7	3.17	315.01
Montagu's Harrier	6	2.72	367.52
Osprey	6	2.72	367.52
White-eyed Buzzard	6	2.72	367.52
Peregrine Falcon	5	2.27	441.02
Red-headed Vulture	4	1.81	551.28
Red-necked Falcon	4	1.81	551.28
Kite spp.	3	1.36	735.03
Common Buzzard	2	0.91	1102.55
Eastern Barn Owl	2	0.91	1102.55
Grey-headed Fish-Eagle	2	0.91	1102.55
Pallid Harrier	2	0.91	1102.55
Tawny Eagle	2	0.91	1102.55
Aquila spp.	1	0.45	2205.10
Besra	1	0.45	2205.10
Black Baza	1	0.45	2205.10
Buteo spp.	1	0.45	2205.10
Circus spp.	1	0.45	2205.10
Eastern Marsh Harrier	1	0.45	2205.10
Eurasian Sparrowhawk	1	0.45	2205.10
Indian Vulture	1	0.45	2205.10
Jungle Owlet	1	0.45	2205.10
Harrier spp.	1	0.45	2205.10
Pied Harrier	1	0.45	2205.10
Rufous-bellied Eagle	1	0.45	2205.10
Steppe Eagle	1	0.45	2205.10
White-bellied Sea-eagle	1	0.45	2205.10
Total	1749		

Table 06: Relative abundance of raptors recorded in nocturnal survey

Species	Number observed	Index of relative abundance	Hours required to detect one individual raptor
Spotted Owlet	588	823.41	1.21
Owl spp.	117	163.84	6.10
Eastern Barn Owl	76	106.43	9.40
Indian Scops-Owl	74	103.63	9.65
Unknown Sp.	37	51.81	19.30
Jungle Owlet	34	47.61	21.00
Mottled Wood-Owl	34	47.61	21.00
Rock Eagle-Owl	28	39.21	25.50
Brown Fish-Owl	21	29.41	34.00
Brown Boobook	17	23.81	42.01
Oriental Scops-Owl	13	18.20	54.93
Brown Wood-Owl	11	15.40	64.92
Spot-bellied Eagle Owl	5	7.00	142.82
Total	1055		

The effort-standardised relative abundance of each raptor species recorded is given in Tables 04, 05, and 06 for the diurnal vehicle survey, diurnal foot survey, and nocturnal point counts, respectively. This index for each species is most important in this assessment, as it serves as the baseline for future assessments to compare population trends and estimate population. For nocturnal birds, instead of standardising efforts by the number of point counts, hours spent listening to vocalisations were used. Though established point-count numbers vary within each surveyed block, the 10-minute listening period at each point-count location was maintained consistently.

In both survey methods for diurnal raptors, the raptors with the first five relative abundance indices are either carnivorous or carrion-feeding generalist species. None of the insectivorous raptors was recorded in high abundance; these results suggest the threatened state of grassland habitats in Tamil Nadu.

4.5. ABUNDANCE OF RAPTORS AT DIVISION LEVEL

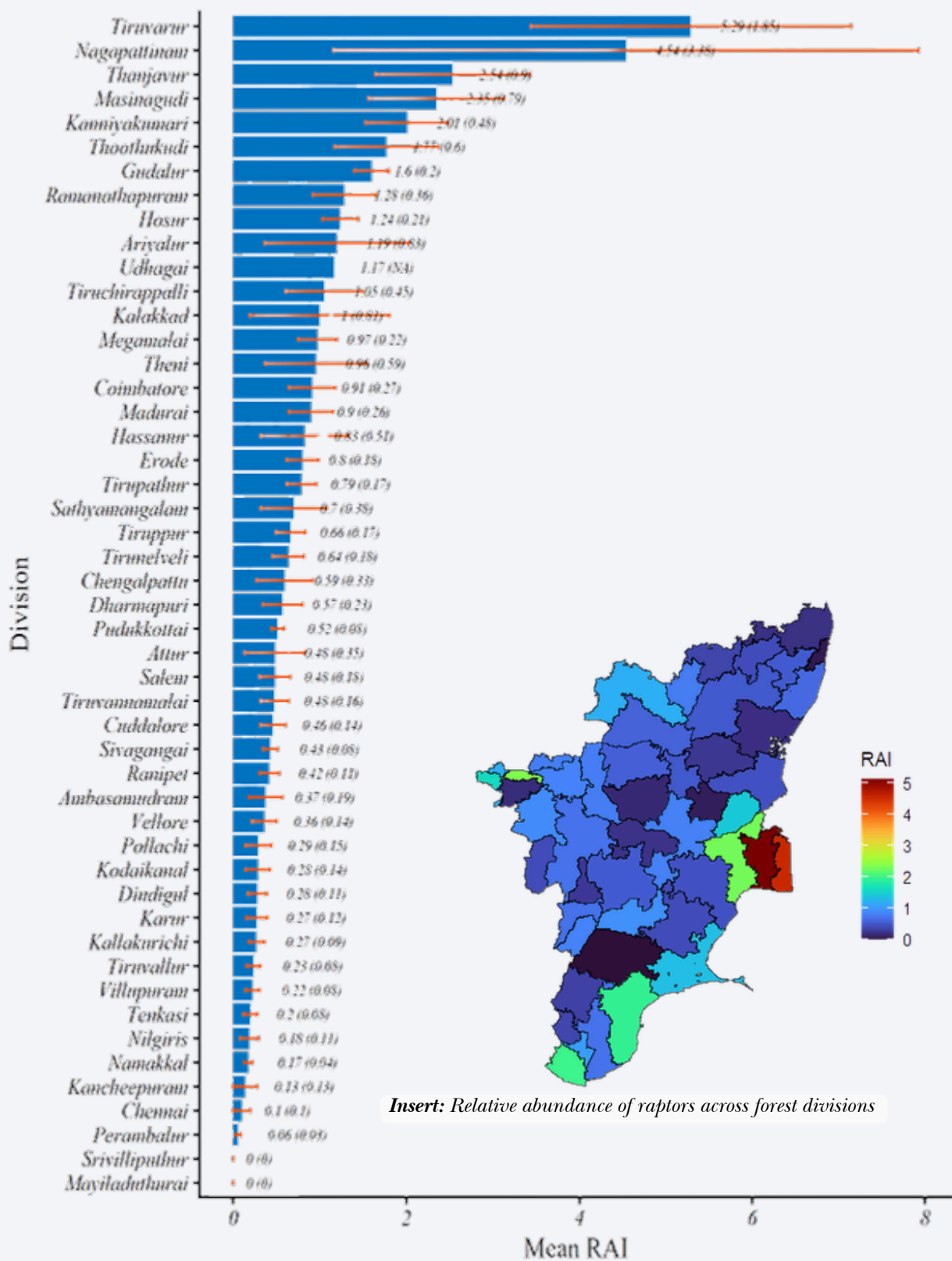


Figure 11: Sampling block wise mean relative abundance and standard error of raptor counts in each forest division on foot survey method

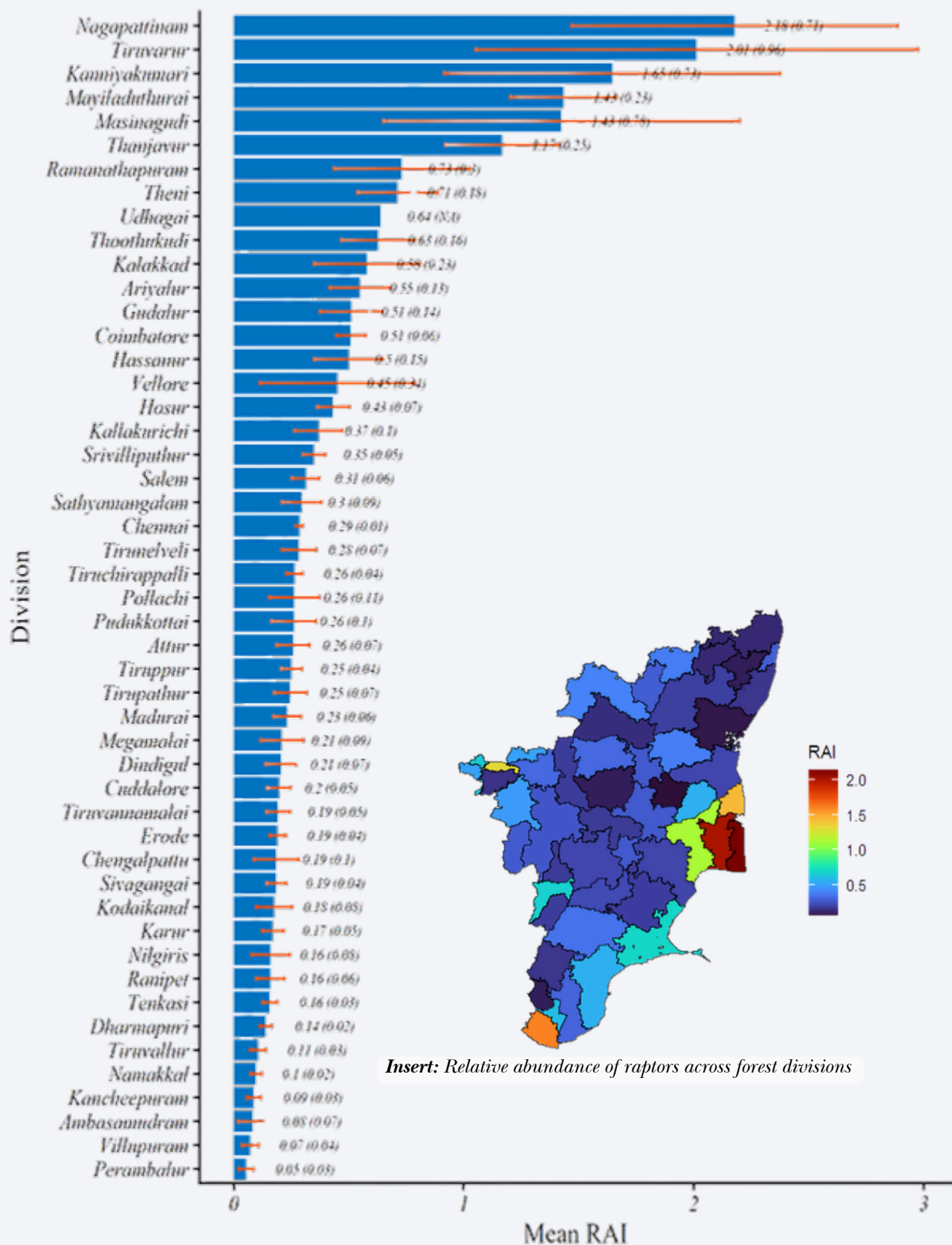


Figure 12: Sampling block wise mean relative abundance and standard error of raptor counts in each forest division on vehicle survey method

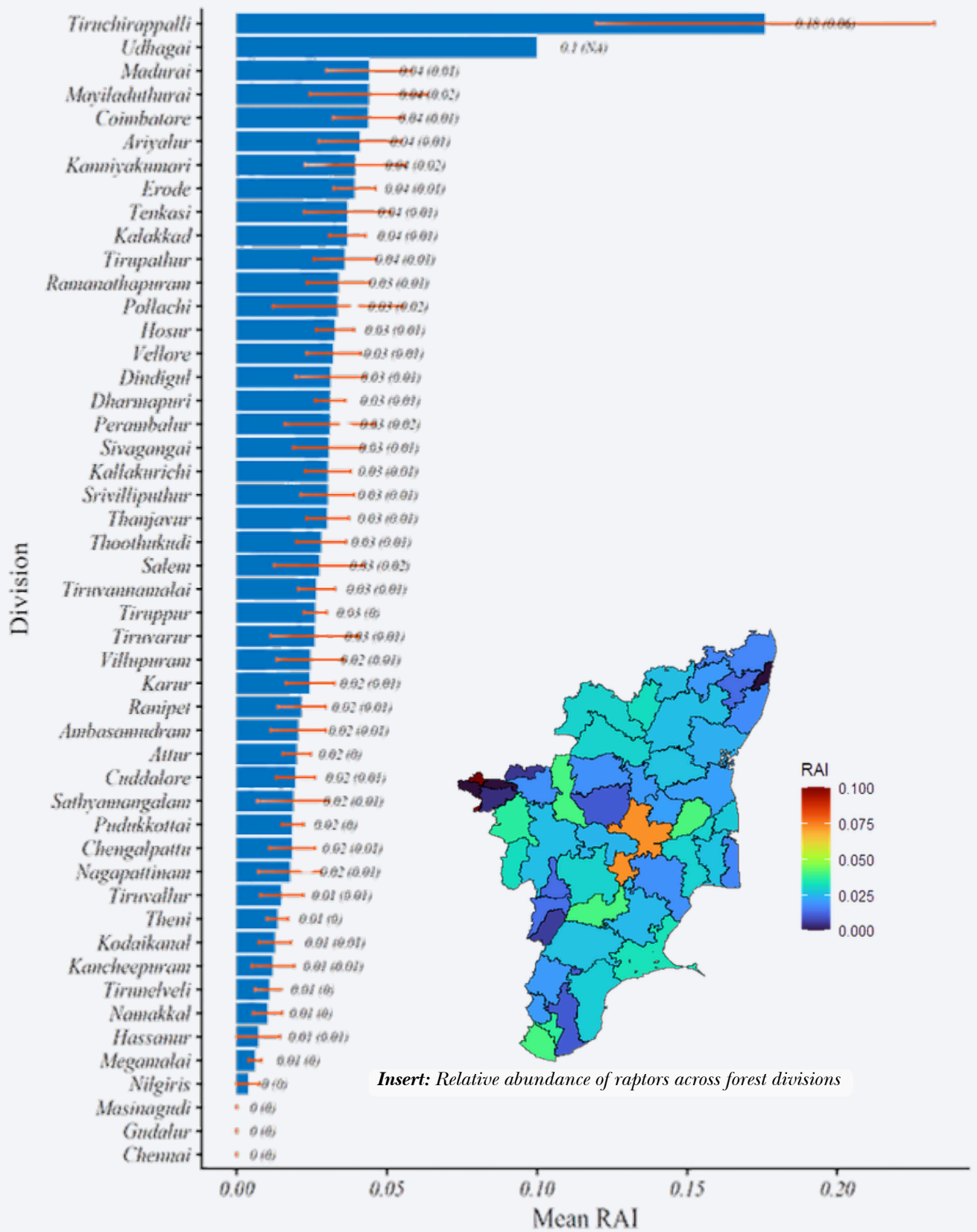


Figure 13: Sampling block wise mean relative abundance and standard error of raptor counts in each forest division on Nocturnal survey method

The relative abundance of raptors for each forest division was estimated by pooling all raptor populations, surveyed in all the sampling blocks with respect to each forest divisions. Since the efforts made across the three sampling protocols are independently varied across blocks, comparing the RAI of each division by pooling the species data from all three methods will not yield meaningful results. So, the index was calculated and interpreted independently for each survey protocol.

Table 07: Relative abundance index of raptor species for top 10 forest divisions on three survey methods

Method	Top 10 Forest Divisions	Effort	Mean RAI $\pm$ SE	Relative Abundance Index
Foot survey				
1.	Tiruvarur	16.40	5.29 (± 1.85)	5.12
2.	Nagapattinam	24.00	4.54 (± 3.39)	4.54
3.	Masinagudi	13.10	2.35 (± 0.78)	2.37
4.	Thanjavur	69.50	2.54 (± 0.89)	2.30
5.	Kanniyakumari	33.10	2.01 (± 0.48)	1.99
6.	Thoothukudi	71.50	1.89 (± 0.62)	1.86
7.	Gudalur	10.00	1.60 (± 0.20)	1.60
8.	Ariyalur	30.00	1.43 (± 0.97)	1.30
9.	Ramanathapuram	77.30	1.39 (± 0.37)	1.28
10.	Hosur	97.10	1.24 (± 0.20)	1.19
Vehicle survey				
1.	Nagapattinam	79.50	2.17 ± 0.70	2.14
2.	Tiruvarur	80.00	2.01 ± 0.96	2.01
3.	Kanniyakumari	100.70	1.64 ± 0.73	1.61
4.	Mayiladuthurai	43.85	1.43 ± 0.23	1.44
5.	Masinagudi	35.00	1.42 ± 0.77	1.31
6.	Thanjavur	218.80	1.16 ± 0.24	1.12
7.	Ramanathapuram	265.70	0.73 ± 0.29	0.68
8.	Theni	79.90	0.71 ± 0.17	0.66
9.	Udhagai	25.00	0.64 ± 0.00	0.64
10.	Kalakkad	41.00	0.57 ± 0.22	0.59
Nocturnal survey				
1.	Udhagai	1.00	0.10 ± 0.00	0.10
2.	Tiruchirappalli	5.50	0.17 ± 0.05	0.07
3.	Ariyalur	13.17	0.04 ± 0.01	0.04
4.	Madurai	14.50	0.04 ± 0.01	0.04
5.	Erode	18.33	0.03 ± 0.00	0.04
6.	Kanniyakumari	10.00	0.03 ± 0.01	0.04
7.	Kalakkad	4.50	0.03 ± 0.00	0.04
8.	Coimbatore	14.17	0.04 ± 0.01	0.04
9.	Ramanathapuram	26.33	0.03 ± 0.01	0.03
10.	Pollachi	6.33	0.03 ± 0.02	0.03

In the foot survey method, Tiruvarur, Nagapattinam, and Masinagudi were the top divisions, with the highest relative abundances of 5.12, 4.54, and 2.37 birds, respectively. In the vehicle survey, Nagapattinam (2.14 birds), Tiruvarur (2.01 birds), and Kanyakumari (1.61 birds) divisions had the highest relative abundance. Among nocturnal birds, the Udhagai, Tiruchirappalli, and Ariyalur divisions had higher relative numbers (Table 07).

However, this ordering of divisions was inconsistent when examining the mean RAI across blocks within each division. The mean number of raptors per surveyed block in Masinagudi division was left as fourth, allowing Thanjavur division to move up to third position. The same way minor rank shifts were observed in the other two sampling protocols for the mean RAI among divisions. This variation is, understandably, the result of habitat heterogeneity or inadequate sampling, which led to variation in the number of specific groups of species detections (Fig. 11, 12 & 13).

This inference and inter-variation of blocks with respect to divisions in species numbers is also pronounced within divisions. The relative abundance of raptors with respect to sampling effort in the foot survey among divisions was significantly differed ($\chi^2 = 153.1$, $df = 48$, $p = 6.676e-13$). The same significant difference was observed in the vehicle survey (Table 07) as well ($\chi^2 = 151.07$, $df = 48$, $p = 1.364e-12$). However, in nocturnal species, the variation is less pronounced ($\chi^2 = 71.436$, $df = 48$, $p = 0.01571$).

Table 08: Results of non-parametric rank sum test on relative abundance of raptor detections on all three survey methods

Survey Protocol	χ^2	df	sig. p
Vehicle	151.07	48	1.36E-12
Foot	143.06	47	1.23E-11
Nocturnal	71.436	48	0.01571

The nonparametric rank-sum test of relative raptor abundance across divisions by survey method showed significant variation in two diurnal survey methods (Table 08). A Dunn's post-hoc pairwise comparison test was carried out using the relative abundance values of each forest division. The result shows that the vehicle survey protocol indicated much heterogeneity in raptor abundance among divisions, comparable with Villupuram and Thanjavur (with a high Z value and adjusted $p < .001$). In the foot-based survey, a significant pairwise difference also exists. Still, unlike the vehicle-based survey protocol, the differences emerged from Srivilliputhur division (Fig. 14), since it recorded none of the raptor species in the Foot-based survey. Importantly, nocturnal surveys did not reveal significant variation in RAI across divisions, indicating a relatively homogeneous distribution of nocturnal raptors or an advantage in detectability across landscapes, driven solely by vocalisation.

Overall, the combined findings demonstrate that raptor distribution across Tamil Nadu is spatially heterogeneous but strongly influenced by survey methodology. Vehicle surveys tend to reflect broader landscape-level patterns, whereas foot surveys capture localised ecological variation. The absence of significant differences in nocturnal surveys further highlights potential differences in ecological drivers or detectability between diurnal and nocturnal raptor communities.

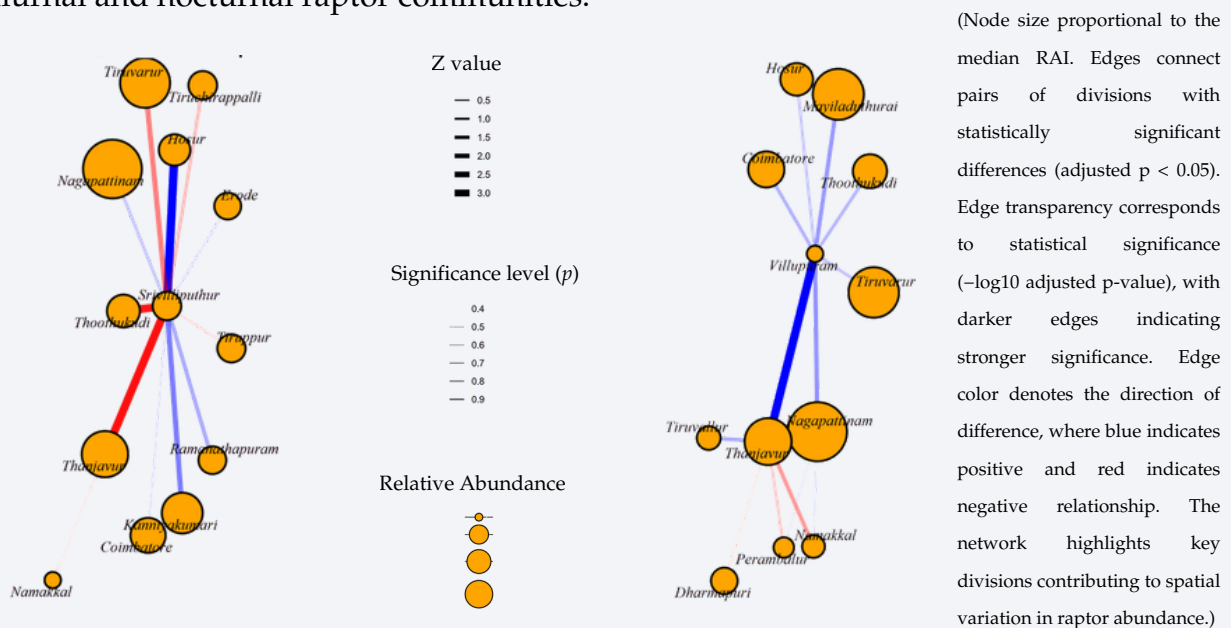


Figure 14: Network representation of significant pairwise differences in relative abundance index of raptor across divisions of Tamil Nadu based on Dunn's post-hoc test

4.6. ABUNDANCE OF RAPTORS AT DISTRICT LEVEL

The relative abundance of raptors for each district was determined by grouping the raptor detection data from all blocks within each district. Tiruvarur, Nagapattinam, and Thanjavur districts recorded high raptor abundance of 5.12, 4.54, and 2.29 raptors, respectively, in the foot survey method. In the vehicle survey method, the first three districts were Nagapattinam, Tiruvarur, and Kanniyakumari, with recorded abundances of 2.14, 2.01, and 1.61, respectively. Tiruchirappalli, Ariyalur and Kanniyakumari districts were top three for the Nocturnal raptors (Table 9).

Table 09: Relative abundance index of raptor species for top 10 districts on three survey methods

Method	Top 10 Districts	Effort	Mean RAI ± SE	Relative Abundance Index
Foot survey				
1.	Tiruvarur	16.40	5.28±1.85	5.12
2.	Nagapattinam	24.00	4.54±3.38	4.54
3.	Thanjavur	65.00	2.54±0.99	2.29
4.	Kanniyakumari	33.10	2.00±0.48	1.99
5.	Thoothukudi	71.50	1.89±0.62	1.94
6.	Ariyalur	30.00	1.43±0.97	1.43
7.	Ramanathapuram	77.30	1.38±0.37	1.33
8.	Krishnagiri	97.10	1.23±0.21	1.19
9.	Nilgiris	48.90	1.02±0.38	1.00
10.	Erode	90.20	0.86±0.19	0.90
Vehicle survey				
1.	Nagapattinam	79.50	2.17±0.71	2.14
2.	Tiruvarur	80.00	2.01±0.96	2.01
3.	Kanniyakumari	100.70	1.64±0.73	1.61
4.	Mayiladuthurai	43.85	1.43±0.20	1.44
5.	Thanjavur	209.40	1.17±0.20	1.13
6.	Ramanathapuram	265.70	0.73±0.29	0.68
7.	Thoothukudi	299.20	0.62±0.16	0.55
8.	Ariyalur	129.90	0.54±0.13	0.55
9.	Krishnagiri	295.70	0.43±0.07	0.40
10.	Erode	327.10	0.42±0.13	0.40
Nocturnal survey				
1.	Tiruchirappalli	5.50	0.17±0.05	0.07
2.	Ariyalur	13.17	0.04±0.01	0.04
3.	Kanniyakumari	10.00	0.03±0.02	0.04
4.	Madurai	23.33	0.03±0.01	0.04
5.	Coimbatore	19.67	0.03±0.01	0.03
6.	Ramanathapuram	26.33	0.03±0.01	0.03
7.	Tirupathur	11.67	0.03±0.01	0.03
8.	Thanjavur	20.33	0.03±0.01	0.03
9.	Kallakurichi	32.17	0.03±0.01	0.03
10.	Dharmapuri	28.00	0.03±0.01	0.03

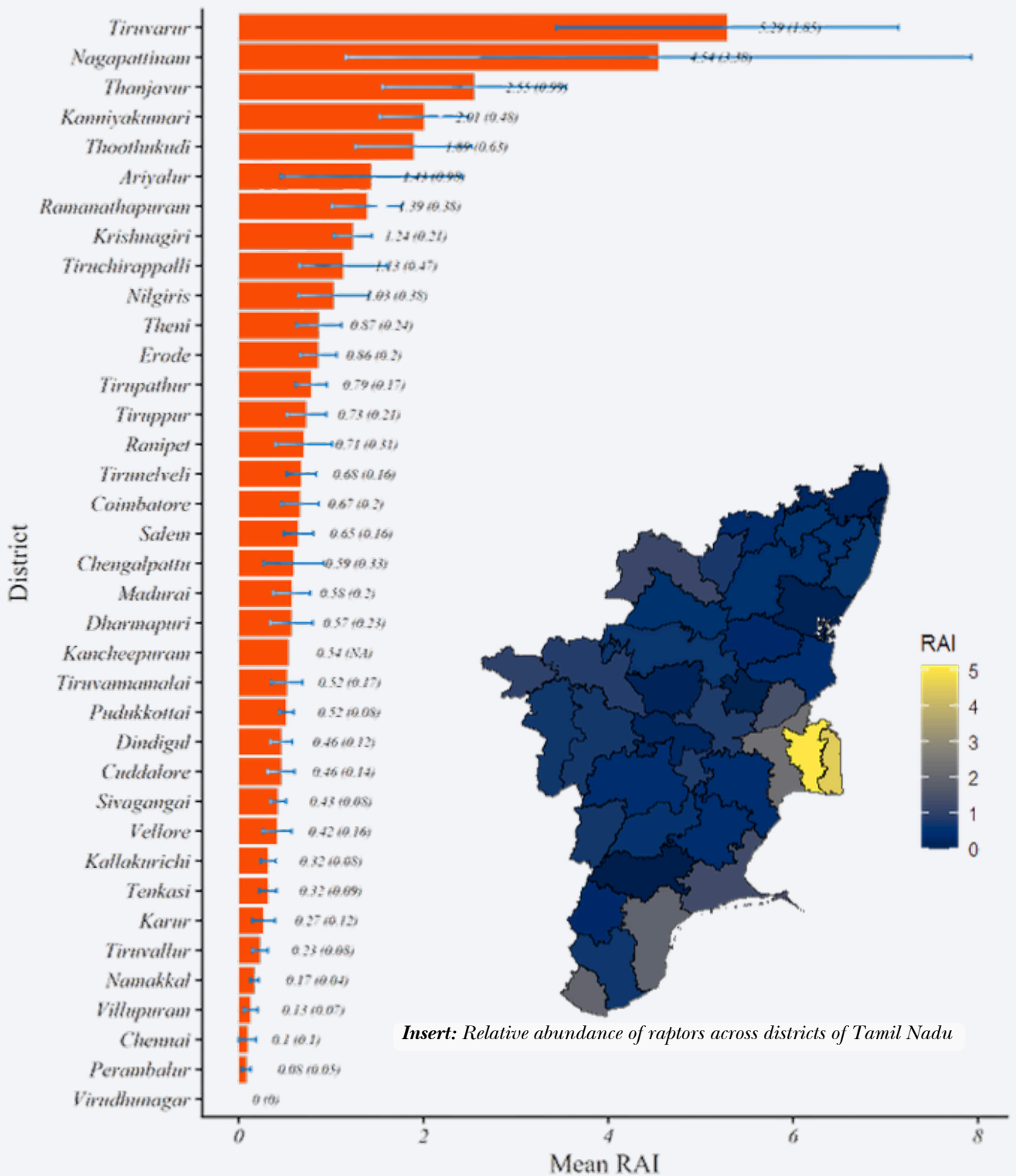


Figure 15: Sampling block wise mean relative abundance and standard error of raptor counts in each district on Foot survey method

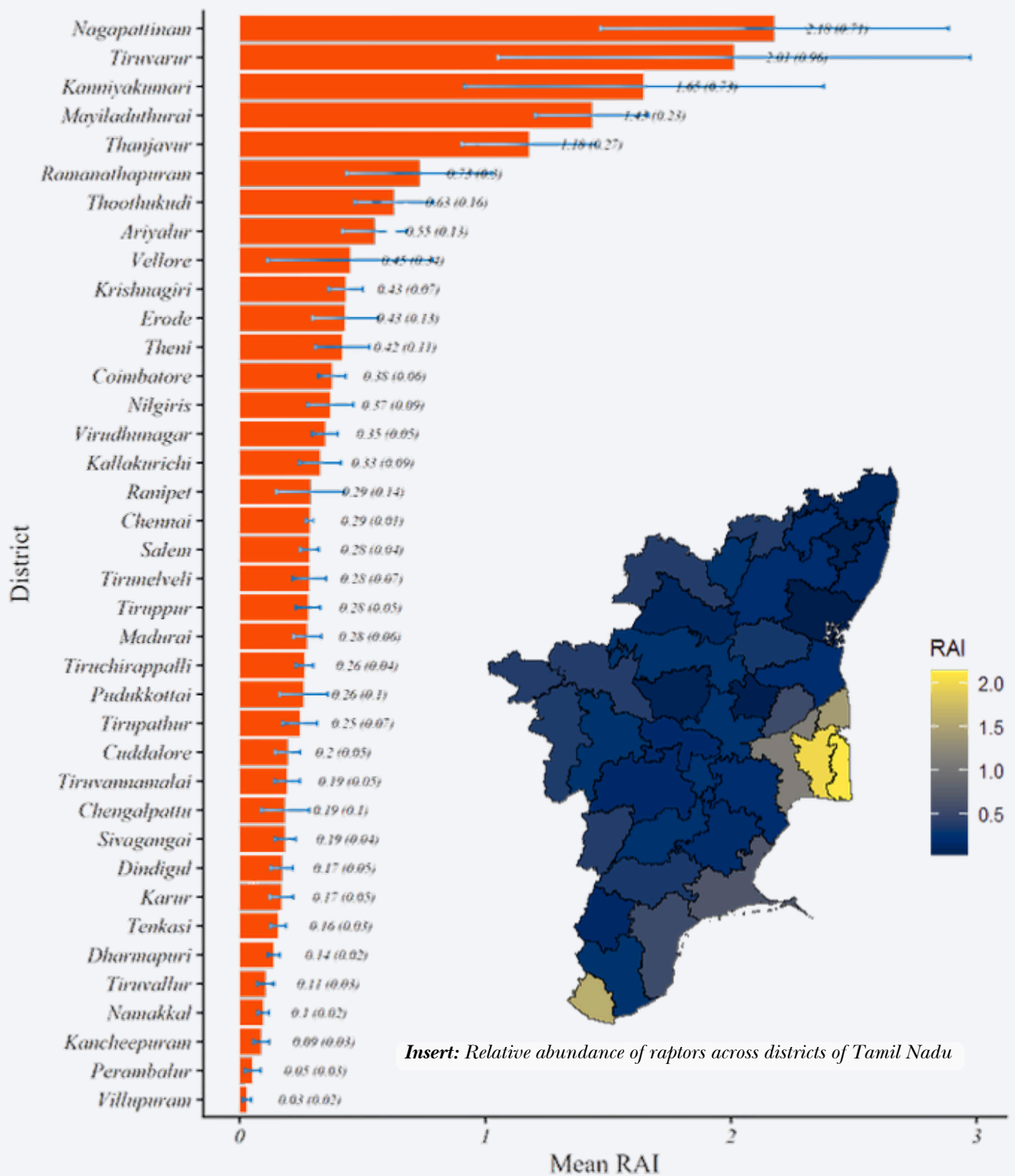


Figure 16: Sampling block wise mean relative abundance and standard error of raptor counts in each District on Vehicle survey method

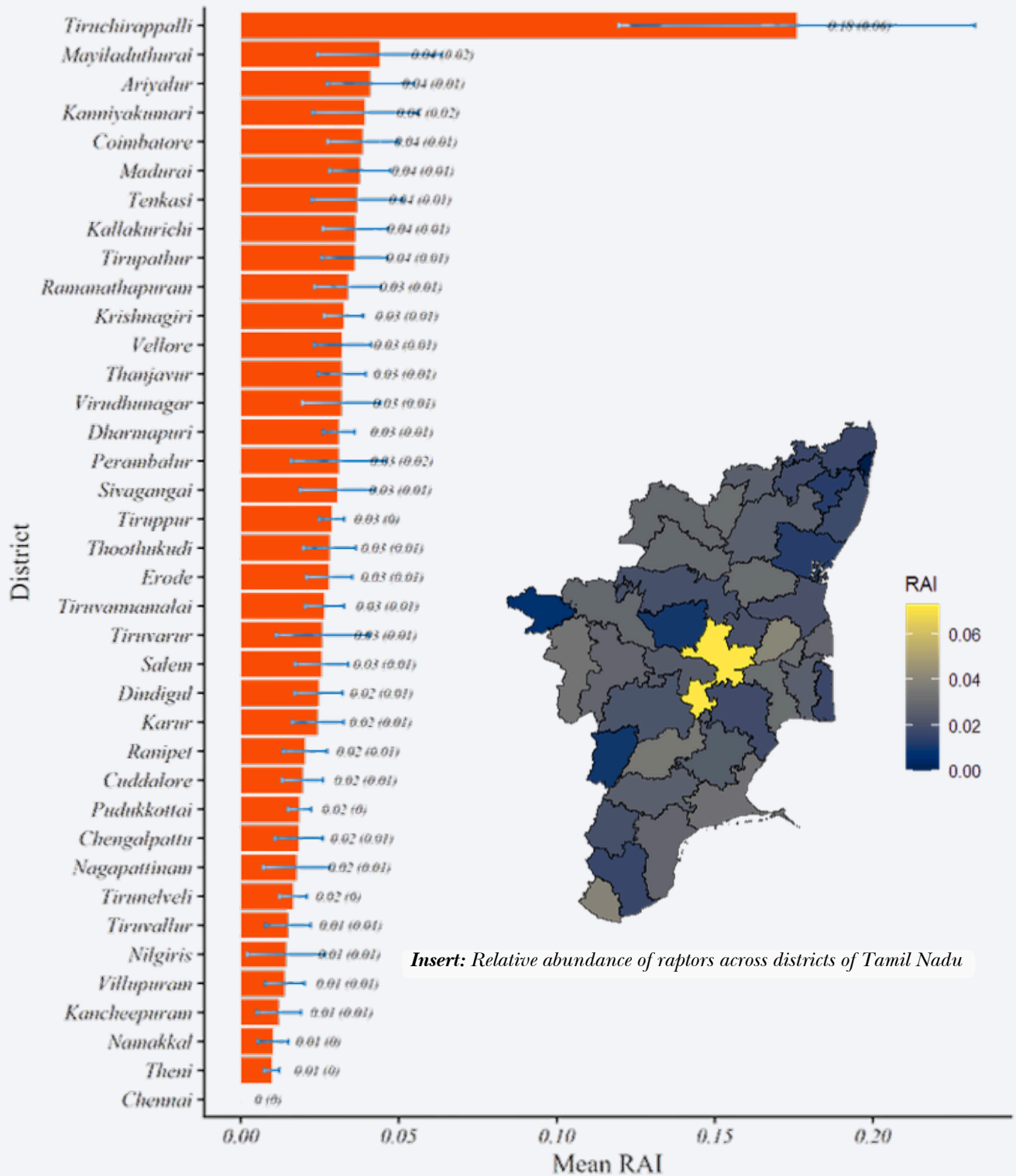


Figure 17: Sampling block wise mean relative abundance and standard error of raptor counts in each District on Nocturnal survey method

4.7. RICHNESS OF RAPTORS

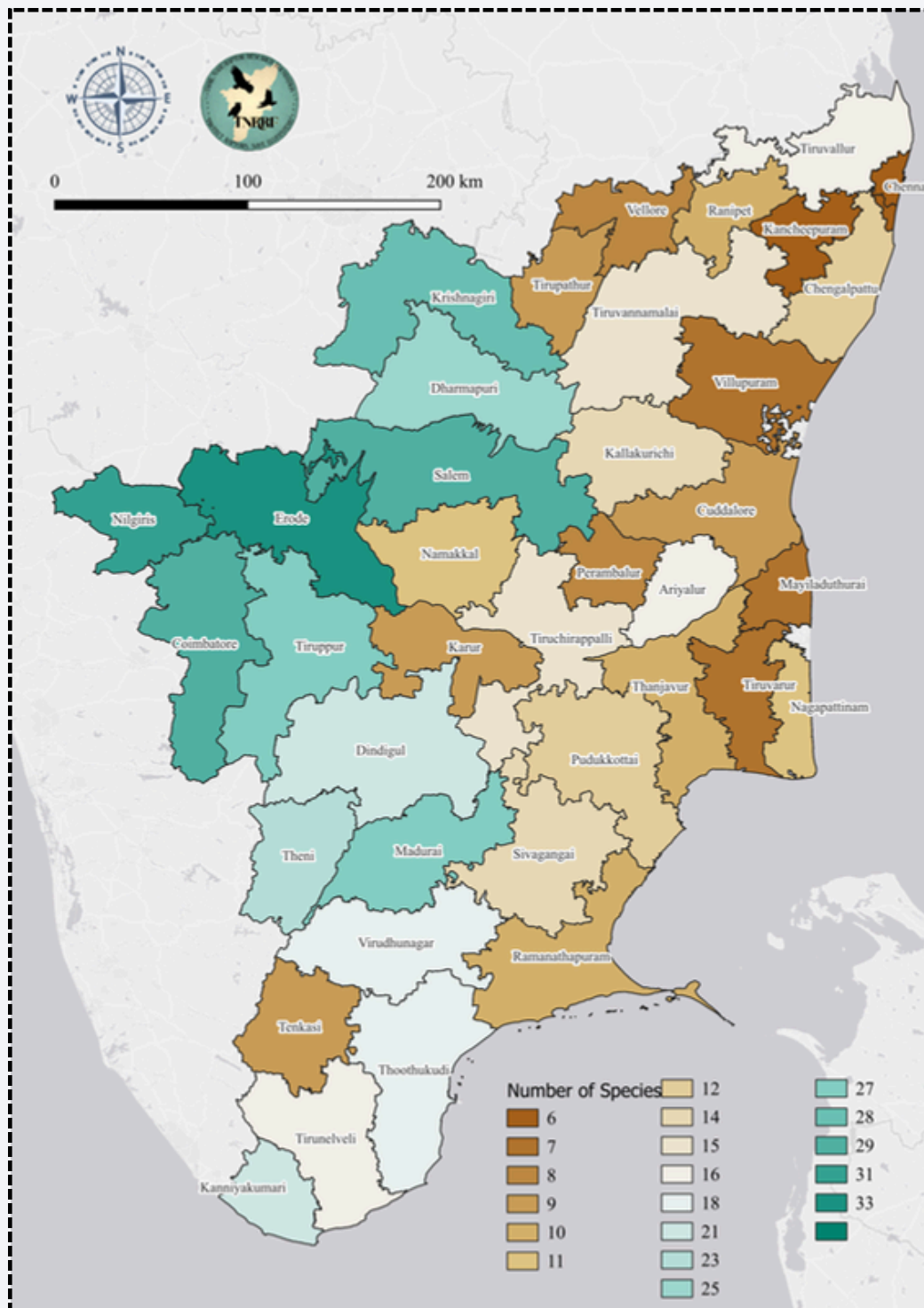


Figure 18: Map showing the raptor richness in different districts of TN

Richness of raptor species across districts of Tamil Nadu shows, species richness is increased with the increase in forest cover. The districts buffered with Western Ghats region had high richness compared to coastal districts (Fig. 18).

Table 10: Raptor species richness across forest divisions of Tamil Nadu

Sl. No	Circle	Division	No. of Blocks	Total Sightings	Number of Species	Nocturnal Species	Diurnal	
							Vehicle	Foot
1	Chennai	Chengalpattu	6	68	11	3	4	7
2		Chennai	2	14	2	0	2	1
3		Kancheepuram	4	16	4	2	2	2
4		Tiruvallur	10	68	15	2	10	3
5	Salem	Attur	5	54	11	6	8	3
6		Namakkal	10	25	8	2	5	5
7		Salem	11	162	26	9	22	12
8	Trichy	Ariyalur	6	150	13	4	10	6
9		Mayiladuthurai	4	10	6	2	4	2
10		Nagapattinam	4	288	6	4	4	4
11		Perambalur	6	23	7	4	2	2
12		Pudukkottai	15	152	9	4	6	5
13		Thanjavur	11	451	7	4	4	3
14		Tiruchirappalli	14	124	15	2	12	14
15		Tiruvarur	4	378	6	5	5	2
16	ATR, Coimbatore	Coimbatore	9	213	29	9	17	17
17		Pollachi	5	54	12	7	6	4
18		Tiruppur	17	311	22	6	16	15
19	Dharmapuri	Dharmapuri	12	103	15	6	9	8
20		Hosur	16	265	26	8	15	19
21	Dindigul	Dindigul	15	75	13	7	8	4
22		Karur	8	24	6	2	4	2
23		Kodaikanal	4	29	9	4	7	3
24	KMTR, Tirunelveli	Ambasamudram	3	20	9	3	4	5
25		Kalakkad	2	48	11	4	7	4
26		Kanniyakumari	5	294	21	11	11	13
27		Tenkasi	8	40	6	3	3	2
28		Thoothukudi	15	331	19	4	15	11
29	SMTR, Madurai	Tirunelveli	9	113	10	1	6	7
30		Madurai	9	147	21	6	13	13
31		Megamalai	4	39	13	5	6	7
32		Ramanathapuram	13	205	12	3	10	6
33		Sivagangai	13	122	11	5	6	7
34		Srivilliputhur	17	179	26	9	21	0
35	MTR, Ooty	Theni	4	88	17	2	12	9
36		Gudalur	2	40	12	0	10	8
37		Masinagudi	2	73	17	0	13	11
38		Nilgiris	4	19	8	4	5	3
39		Udhagai	1	45	15	4	11	4
40	Vellore	Ranipet	6	50	11	5	4	5
41		Tirupathur	6	69	9	2	7	4
42		Tiruvannamalai	12	129	18	8	8	12
43		Vellore	7	77	10	3	4	7
44	STR, Erode	Erode	9	139	26	10	18	13
45		Hassanur	2	33	12	1	8	8
46		Sathyamangalam	7	60	23	5	18	12
47	Villuppuram	Cuddalore	9	93	18	7	14	10
48		Kallakurichi	10	145	15	5	12	7
49		Viluppuram	12	57	6	2	4	3

 Divisions with high raptor richness

 Divisions with high raptor sightings

Coimbatore, Tiruppur, Erode, and Hosur consistently showed high species richness, suggesting favorable habitat forested conditions. Similarly, Thanjavur and Tiruvarur, despite moderate species richness, exhibited exceptionally high total sightings (451 and 378 respectively), indicating high raptor activity or aggregation, possibly driven by agricultural landscapes or seasonal prey abundance.

4.8. SPATIAL DISTRIBUTION OF RAPTORS

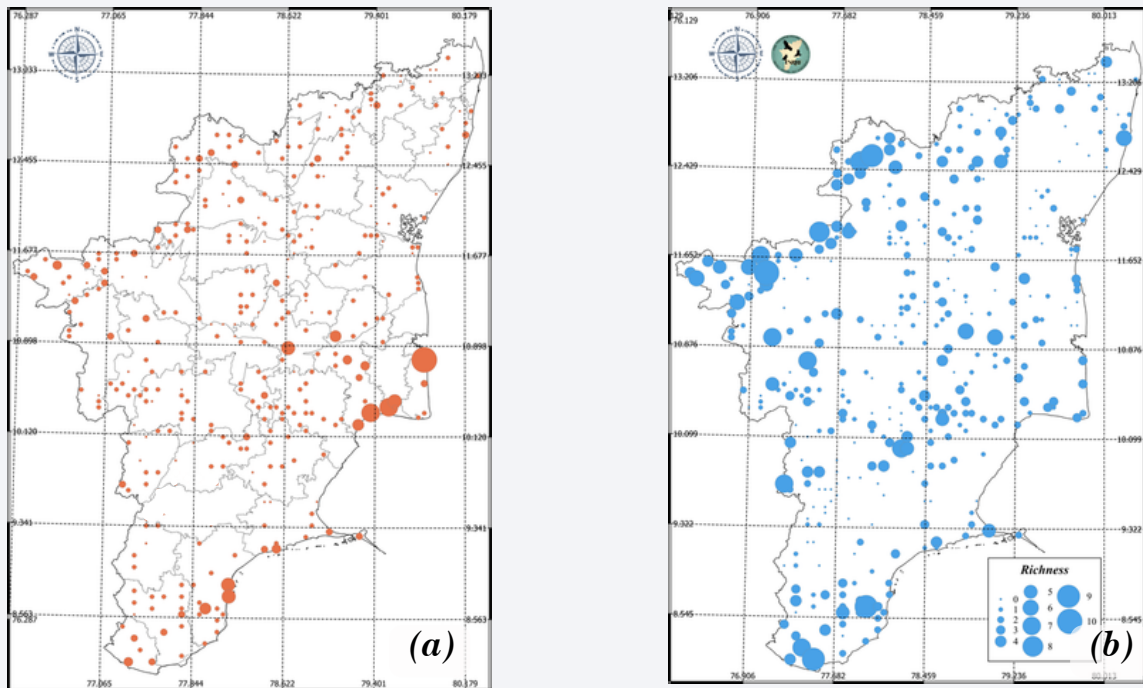


Figure 19: (a) Abundance of raptors in each sampled blocks, (b) richness of raptors in each sampling block for diurnal foot survey

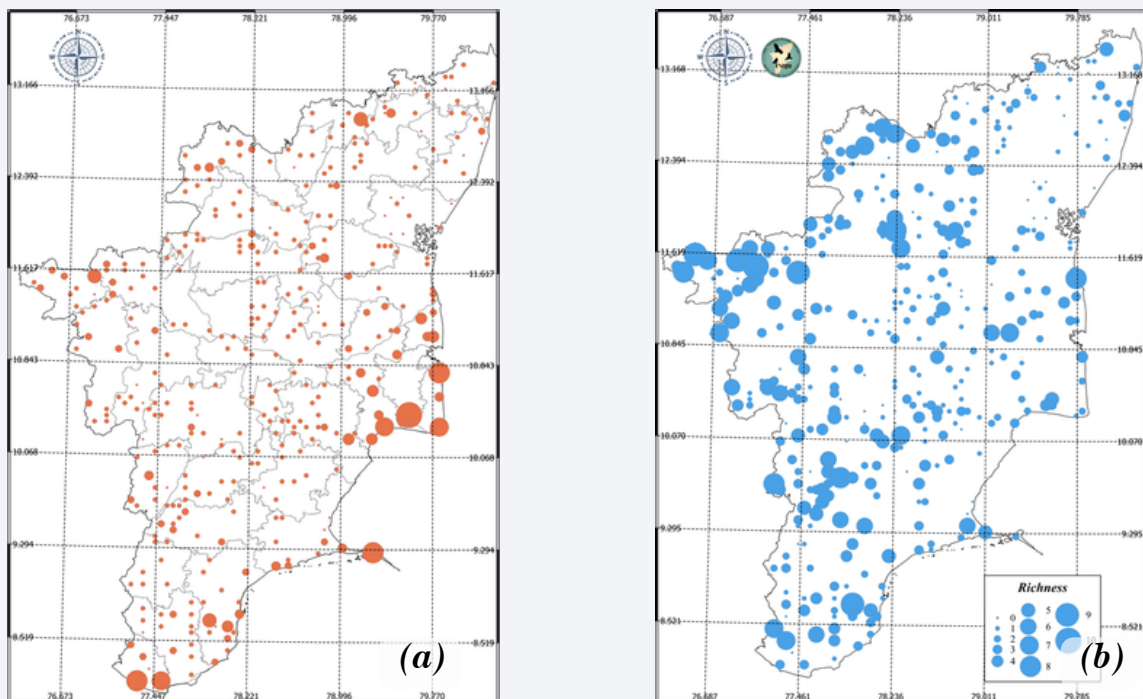


Figure 20: (a) Abundance of raptors in each sampled blocks, (b) richness of raptors in each sampling block for diurnal vehicle survey

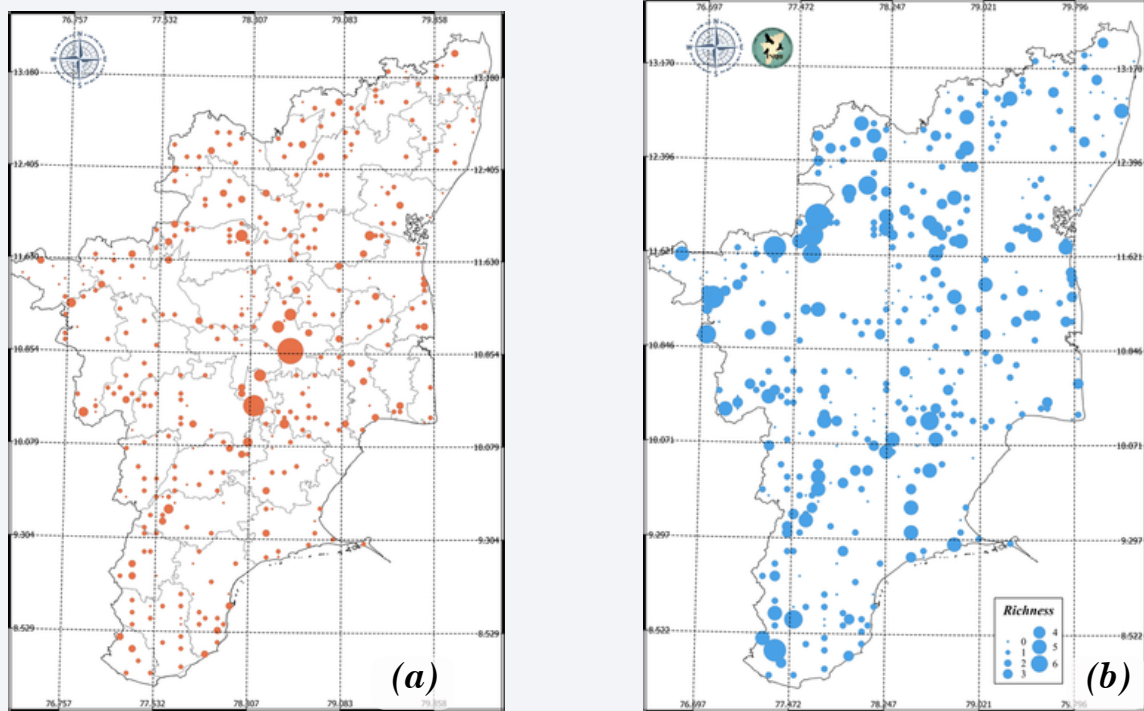


Figure 21: (a) Abundance of raptors in each sampled blocks, (b) richness of raptors in each sampling block for nocturnal survey

When comparing the distributions of raptors and richness across all three methods, we observed a clear distinction in both the number and the presence of raptors. In both the vehicle and foot surveys for diurnal raptors, abundance is skewed towards coastal zones, and richness is skewed towards the western side of the State of Tamil Nadu (Fig. 18 & 19). The extreme numbers of Brahminy kites and black kites, due to their congregation behaviour in coastal zones, are the primary reason for the skewness. Whereas the areas of high species richness in the forested landscape of the Western Ghats, as shown in the richness maps of both methods. Unlike diurnal raptor abundance and richness, nocturnal species richness shows a more even distribution across Tamil Nadu (Fig. 20).

Hierarchical Clustering of Raptor Assemblages

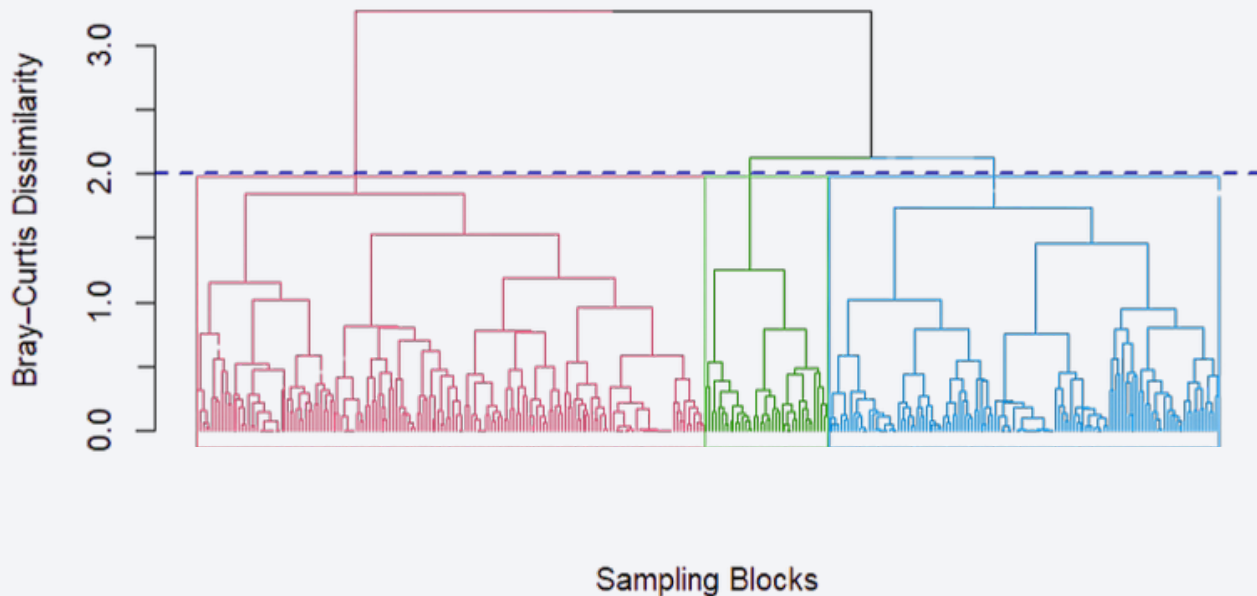


Figure 22: *Hierarchical Cluster Analysis of Raptor Assemblages Using Bray-Curtis Dissimilarity*

Identified three ecologically distinct assemblage clusters explaining ~25.8% of species composition variation ($F = 58.6$, $p = 0.001$).

Cluster 1 — Forest

Crested Serpent Eagle (0.51), Oriental Honey Buzzard (0.39), Black Eagle (0.28). Diverse, forest-dominated community with balanced predator guilds.

Cluster 2 — Open/Semi-Urban

Black Kite (2.15), Brahminy Kite (1.49), White-rumped Vulture (0.19). Mixed landscape with scavenger dominance.

Cluster 3 — Coastal/Disturbed

Brahminy Kite (16.27), Black Kite (9.36). Highly simplified, opportunistic assemblage of generalist species.



Figure 23: Dendrogram shows district clusters of Tamil Nadu based on raptor species richness

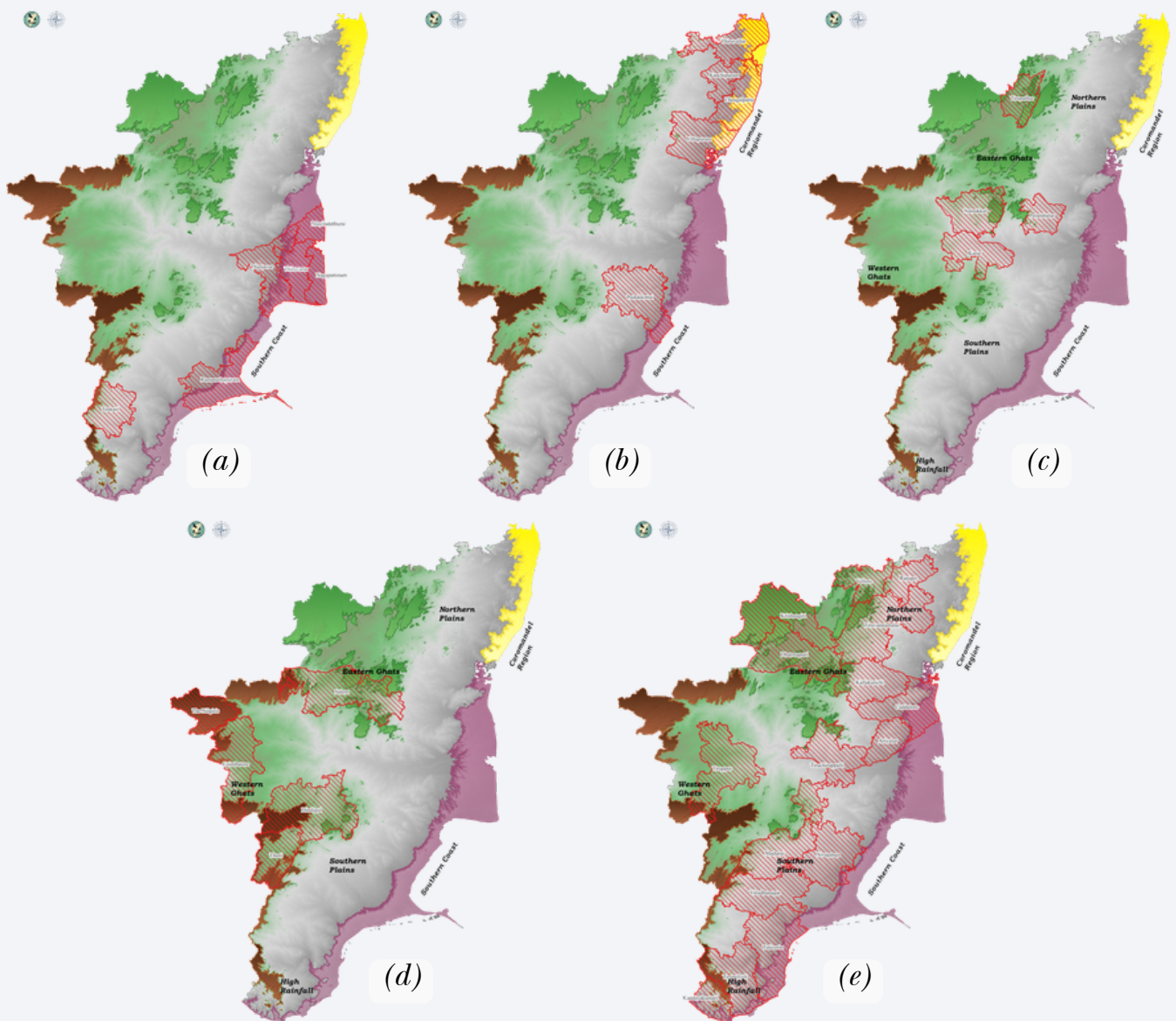
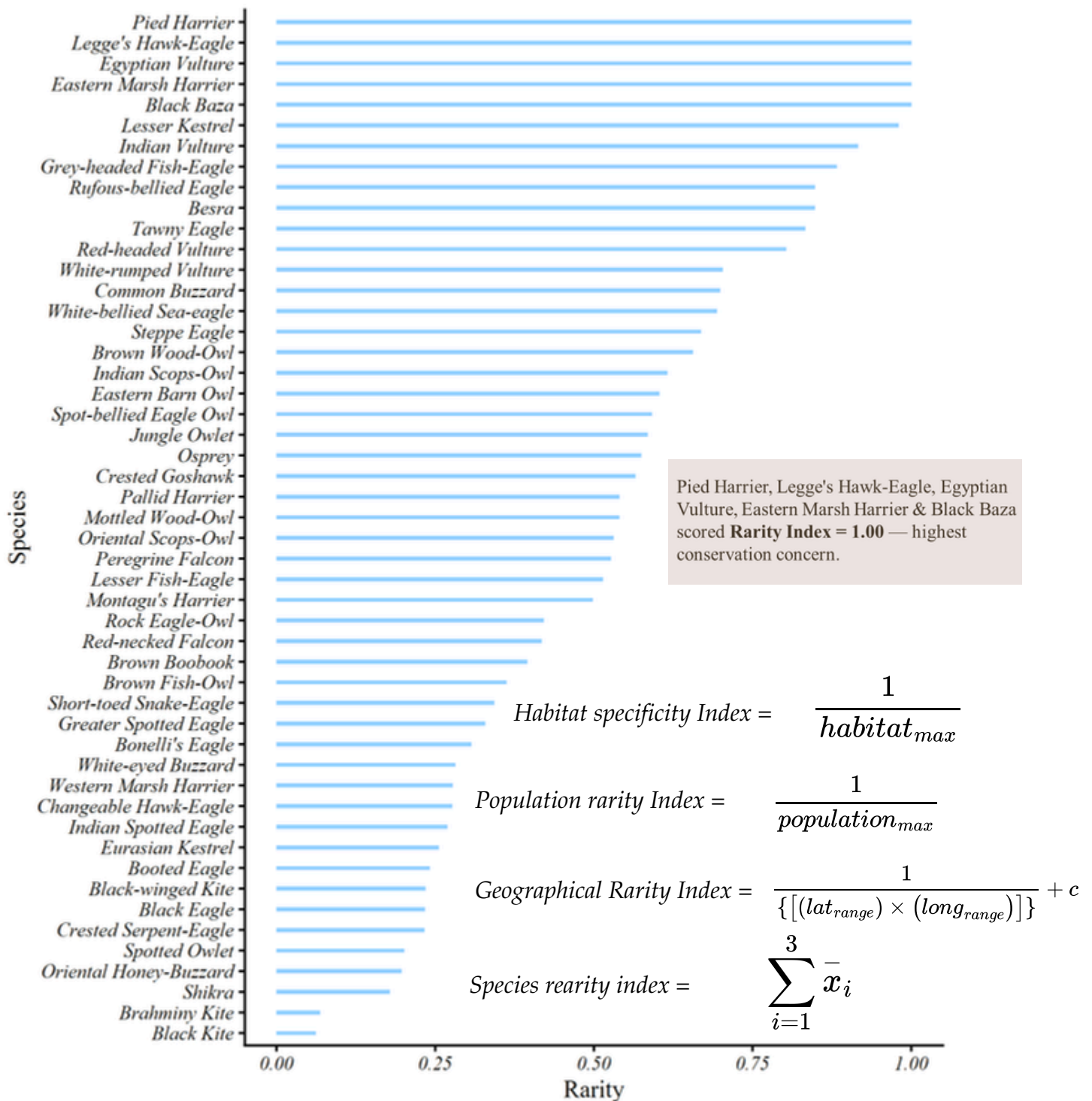


Figure 24: Map showing districts cluster of Tamil Nadu (a) Southern Coast (b) Coromandel Region (c) Northern Plains (d) Southern Plains (e) Western Ghats

4.9. RAPTOR RARITY INDEX IN TAMIL NADU



The approach of Maciel, 2021^[3] was used to create a regional species rarity index by taking average of three indices (Habitat specificity index, Population rarity index and Geographical rarity index)

Figure 25: Raptor species conservation priority index arrived from the 2026 State wide raptor assessment

4.10. CONSERVATION PRIORITY INDEX OF FOREST DIVISIONS

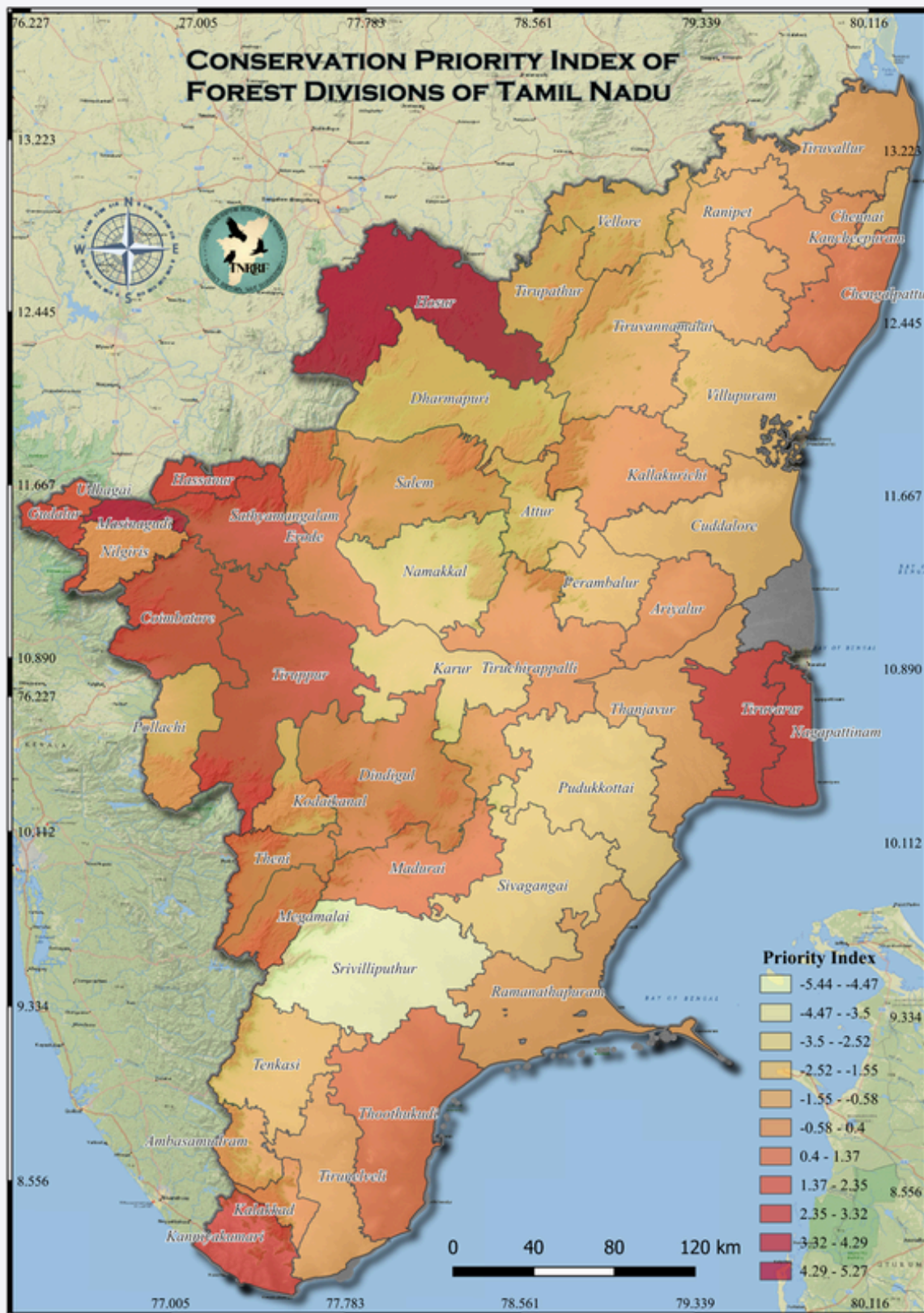


Figure 26: Division priority index for the raptor assessment 2026

5. RECORDS OF THREATENED RAPTORS

Indian Vulture
(n = 3)

Red-headed Vulture
(n = 7)

White-rumped Vulture
(n = 39)

Egyptian Vulture
(n = 1)

Steppe Eagle
(n = 8)

Greater Spotted Eagle
(n = 20)

Indian Spotted Eagle
(n = 31)

Tawny Eagle
(n = 2)



Table 11: Number of sightings of threatened species in different divisions

Forest Divisions	Vulnerable species			Endangered species		Critically Endangered species			No. of Threatened Species
	Greater Spotted Eagle	Indian Spotted Eagle	Tawny Eagle	Egyptian Vulture	Steppe Eagle	Indian Vulture	Red-headed Vulture	White-rumped Vulture	
Coimbatore	6				2			4	3
Cuddalore		1							1
Dharmapuri		7							1
Erode		3							1
Hassanur							1	3	2
Hosur		1							1
Kallakurichi		1							1
Kanniyakumari	1								1
Madurai	1	4							2
Masinagudi	2	1	1		1		2	6	6
Pudukkottai		1							1
Ramanathapuram		3							1
Salem		1							1
Sathyamangalam	1	1				2	1	4	5
Srivilliputhur					1				1
Theni		1		1					2
Tiruppur	1	1							2
Tiruvallur		1							1
Tiruvannamalai		1							1
Thoothukudi	1								1
Udhagai	5				2			2	3
	18	28	1	1	6	2	4	19	

6. RECORDS OF ENDEMIC RAPTORS

An endemic species is a plant or animal that is found only in a particular region of the world and nowhere else naturally. Among raptors (birds of prey), endemism is relatively rare because these birds can fly long distances and often have large ranges. In this context the present assessment recorded five species of raptors endemic to Indian subcontinent. which ensures the viable habitat persistence in Tamil Nadu. Protecting these endemic species is very important because if they disappear from their limited area, they would be lost forever.

Table 12: Sightings of endemic raptors from different forest divisions during the assessment

Forest Divisions	Jungle Owlet	Indian Scops-Owl	Rock Eagle-Owl	Mottled Wood-Owl	Indian Vulture
Ambasamudram	1				
Ariyalur				1	
Attur	3	1		3	
Chengalpattu		2			
Coimbatore	3	1	3	1	
Cuddalore			3	1	
Dharmapuri		1	4	4	
Dindigul	6	4		1	
Erode	5	3	4	2	
Hosur		5	4	4	
Kalakkad			1	1	
Kallakurichi	5		1		
Kanniyakumari	6	4	2		
Madurai		8	1	1	
Megamalai		2	1		
Namakkal	1		1		
Perambalur		5			
Pollachi		3			
Pudukkottai		2			
Ranipet	1	1		1	
Salem	2	2	2	2	
Sathyamangalam	1	3		1	2
Sivagangai	3	6		3	
Srivilliputhur	4	1	1	4	
Tenkasi		2			
Thanjavur		4			
Theni		1			
Thoothukudi			4		
Tirunelveli			1		
Tiruppur			1		
Tiruvallur		6			
Tiruvannamalai	1		3	2	
Udhagai		1			
Vellore	1	1		1	
	43	69	37	33	2



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Jungle Owlet



© Pradeep Patel Division

Indian Scops-Owl



© Hrishabh Patel Division

Mottled Wood-Owl



© Madhav Patel Division

Rock Eagle-Owl



© Harish Patel Division

Indian Vulture



7. RECORDS OF
MIGRATORY RAPTORS



15 Species ➤ Migratory raptors recorded that are using Central Asian Flyways

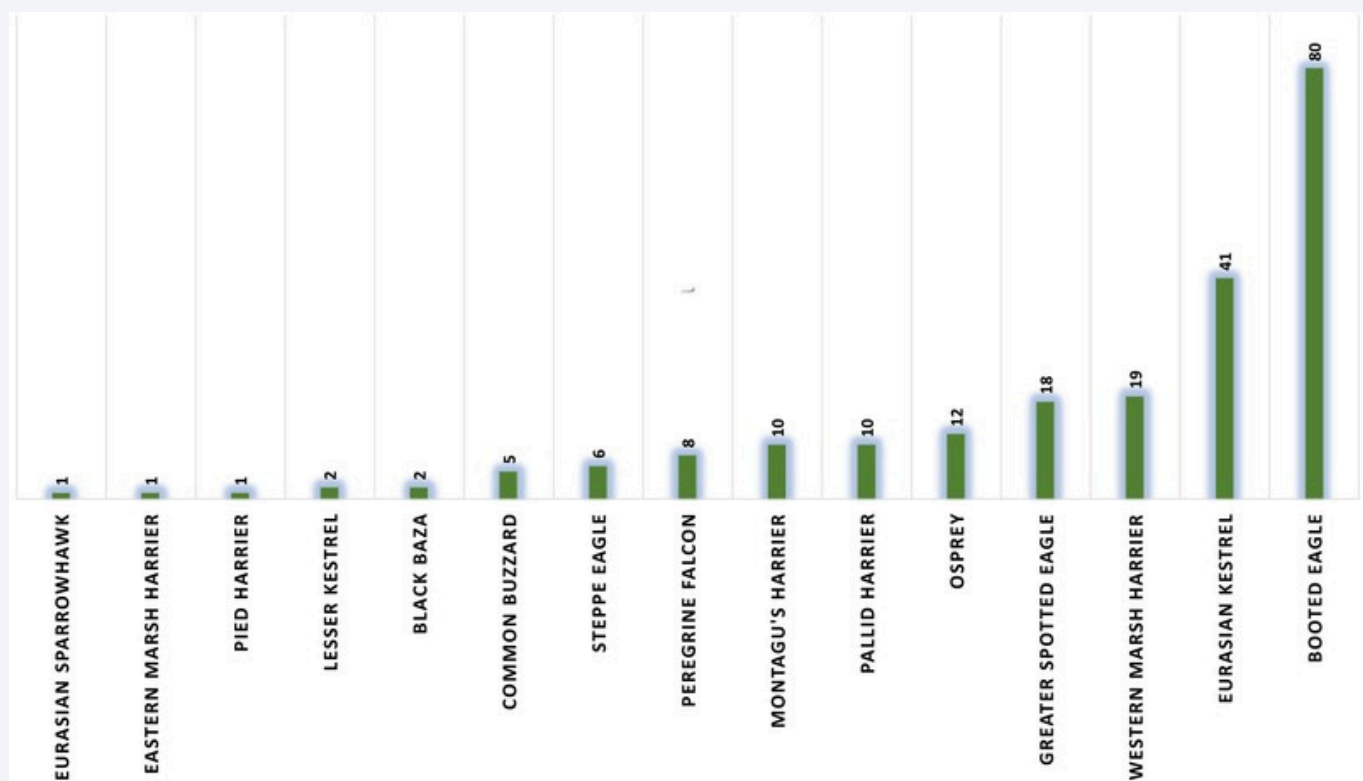


Figure 27: Number of locations where migratory species of raptors recorded in Tamil Nadu

Table 13: List of migratory raptors and their sighting records across forest divisions of Tamil Nadu

Forest Division	Eurasian Sparrow hawk	Eastern Marsh Harrier	Pied Harrier	Lesser Kestrel	Black Baza	Common Buzzard	Steppe Eagle	Peregrine Falcon	Montagu's Harrier	Pallid Harrier	Osprey	Greater Spotted Eagle	Western Marsh Harrier	Eurasian Kestrel	Booted Eagle	No of migratory species
Ambasamudram															1	1
Ariyalur											1		1	2	1	4
Chengalpattu								2	1		2		6		1	5
Coimbatore							1				3	6		3	5	5
Cuddalore													1	1	3	3
Dharmapuri									1						1	2
Erode					1			1						2		3
Gudalur						3								1	2	3
Hosur	1								1				1	7	6	5
Kalakkad															4	1
Kallakurichi										4						1
Kancheepuram											2					1
Kanniyakumari								1				1	1		10	4
Kodaikanal								1				1	1	3	7	5
Madurai												2			1	3
Masinagudi							3				1					3
Megamalai		1	1													
Namakkal															2	1
The Nilgiris						1										1
Pollachi															1	1
Pudukkottai														1		1
Ramanathapuram															2	1
Ranipet											3				1	2
Salem								1						1		2
Sathyamangalam				1								1	1	1	1	5
Sivagangai															4	1
Srivilliputhur						1		1	1	1			2	2	3	7
Theni				1											2	2
Tirunelveli									1	1			1	1		4
Tirupathur														3		1
Tiruppur									2	2		1	2	5	13	6
Tiruvalur								1	1				1	2		4
Tiruvannamalai														3	1	2
Thoothukudi									2	2		1	1	2	7	6
Udhagai					1		2					5				3
Vellore	1	1	1	2	2	5	6	8	10	10	12	18	19	41	80	1

8. EFFECTIVENESS OF VEHICLE AND FOOT SURVEY

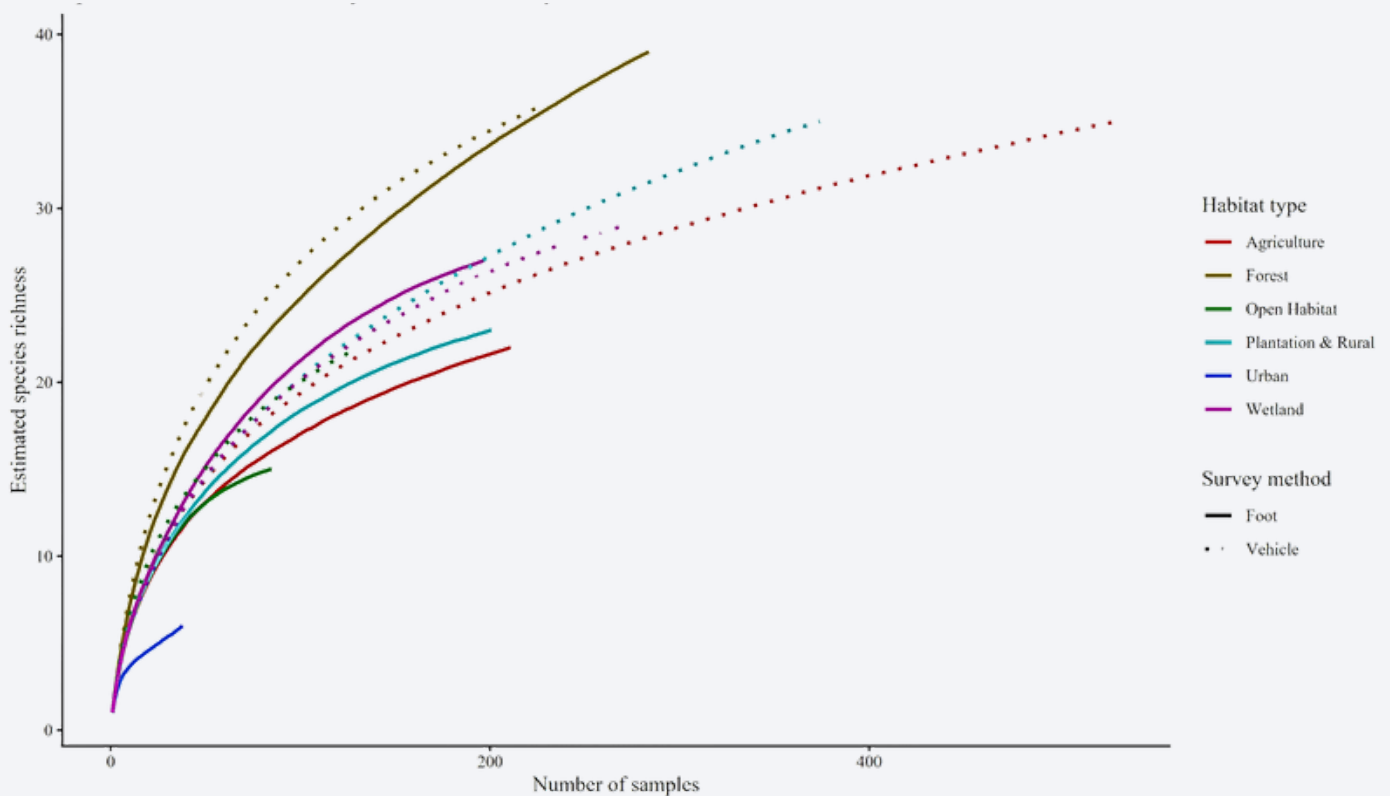


Figure 28: *Species accumulation curve of raptors in different habitat types*

We compared foot survey and vehicle survey for their efficiency in terms species richness (accumulation) with respect to habtiat types. Since nocturnal species sampling protocol had their own independent set of species and different sampling protocol followed comparing nocturnal survey data set was not possible. So only the above mentioned two methods were compared for their independence. Species accumulation curves demonstrated a substancial strenght of Vehicle survey for the better capture than foot survey in all habitat types.

9. INFERENCES

A baseline for the long-term monitoring of raptor populations in Tamil Nadu has been established and documented. Since this exercise surveyed raptor populations in a systematic manner, it laid the foundation for future monitoring.

Comparing species sighting with SoIB 2023: The Tamil Nadu Status of Raptors Threat Index is the same as in India, except for the Eurasian Sparrowhawk. This species, commonly found elsewhere in India was found only once in Tamil Nadu during this assessment.

Grassland habitat specialists are a concern: In both survey methods for diurnal raptors, generalist carnivores and carrion feeders were found to be highly abundant. Insectivores and grassland-dependent birds were very low compared with other species.

Western Tamil Nadu functions as the strongest remaining vulture landscape in the state: The repeated records of critically endangered vultures, viz., White-rumped Vulture, Indian Vulture, and Red-headed Vulture from landscapes including Sathyamangalam, Masinagudi, Coimbatore, Hasanur, and Udhagai indicate that the Nilgiri–Eastern Ghats interface remains one of the last viable vulture habitats in southern India.

Open dry habitats support higher eagle richness than dense forest interiors: The high representation of species such as Steppe Eagle, Tawny Eagle, Greater Spotted Eagle, and harriers suggests that dry plains, agricultural mosaics, and scrub-grassland systems are critical foraging habitats for migratory and resident raptors.

Wetlands of Tamil Nadu are important wintering habitats for migratory raptors: The occurrence of Greater Spotted Eagle, Eastern Marsh Harrier, and other wetland-associated raptors across lowland districts suggests that Tamil Nadu forms part of a major Central Asian Flyway wintering system.

The Species accumulation curve indicates that Vehicle transects are likely to be more effective at detecting species across all habitat types. However, the Foot survey has its own strength in detecting higher number of individuals.

The community pattern among districts of Tamil Nadu showed five hypothetical clusters: 1. Southern Coastal Zone, 2. Coromandel Zone, 3. Eastern Ghats Zone, 4. Western Ghats zone and 5. Southern and Northern Plains.

The division-wise Conservation Priority Index reveals Masinagudi, Kanniyakumari, and Sathyamangalam as areas with strong and reliable raptor presence, irrespective of survey technique. At the lower end of the index, divisions such as Pudukkottai, Sivagangai, and Villupuram warrant further investigation to distinguish between true ecological scarcity and survey limitations.

10. ANNEXURE

Appendix 01: Data sheet for diurnal raptors

District		Team Members	1.	2.	Latitude	Longitude
Forest Division		3.	4.	Start		
Block ID		Start Time		End		
Transect Type	Foot/Vehicle	End Time		Total Kms.		

Species	Latitude	Longitude	Time	Num.	F / P / S / N	Height (mt.)	Distance from observer (mt.)	Direction (N,W,E,S)	Land use type	Road Class	Other Obs.

*F – Flying; P – Perching; S – Soaring; N – Nesting.
 Land Use types – 1. Paddy; 2. Agriculture; 3. Plantations; 4. Rural Habitation; 5. Urban Habitation; 6. Stream; 7. Wetland; 8. River; 9. Sandy Beach; 10 – Forest; 11 – Grassland.
 Road Class – 1. Highway; 2. Rural metal road; 3. Rural unpaved road; 4. Sandy footpath
 Direction – N- North; E-East; W-West; S-South*

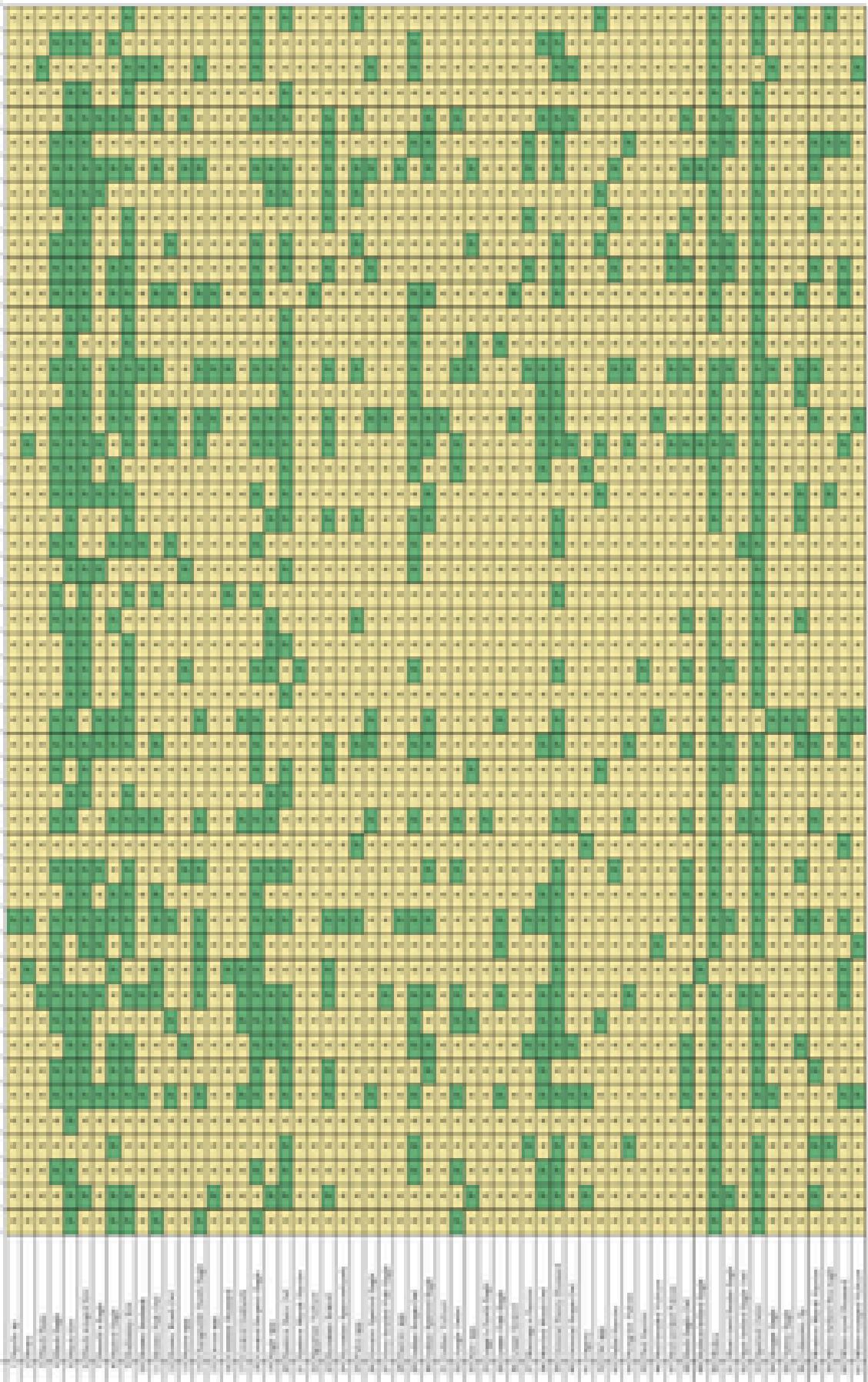
Appendix 02: Data sheet for nocturnal raptors

Annexure 2: Datasheet for Point Count (Nocturnal)

District					Team Members		
Forest Division							
Block ID							

Point No.	Lat	Lon	Time		Species	Seen / Heard	Number
			Start	End			

REMARKS:



Appendix 04: List of raptors in Tamil Nadu

S. No.	Family	Scientific Name	Common Name	IUCN status	Activity
1	Accipitridae	<i>Aviceda leuphotes</i>	Black Baza	LC	Diurnal
2	Accipitridae	<i>Aviceda jerdoni</i>	Jerdon's Baza	LC	Diurnal
3	Accipitridae	<i>Milvus migrans</i>	Black Kite	LC	Diurnal
4	Accipitridae	<i>Elanus caeruleus</i>	Black-winged Kite	LC	Diurnal
5	Accipitridae	<i>Haliastur indus</i>	Brahminy Kite	LC	Diurnal
6	Accipitridae	<i>Ictinaetus malaiensis</i>	Black Eagle	LC	Diurnal
7	Accipitridae	<i>Hieraetus pennatus</i>	Booted Eagle	LC	Diurnal
8	Accipitridae	<i>Nisaetus cirrhatus</i>	Changeable Hawk-Eagle	LC	Diurnal
9	Accipitridae	<i>Spilornis cheela</i>	Crested Serpent-Eagle	LC	Diurnal
10	Accipitridae	<i>Circus gallicus</i>	Short-toed Snake-Eagle	LC	Diurnal
11	Accipitridae	<i>Clanga clanga</i>	Greater Spotted Eagle	VU	Diurnal
12	Accipitridae	<i>Clanga hastata</i>	Indian Spotted Eagle	VU	Diurnal
13	Accipitridae	<i>Nisaetus kelaarti</i>	Legge's Hawk-Eagle	LC	Diurnal
14	Accipitridae	<i>Lophotriorchis kienerii</i>	Rufous-bellied Eagle	NT	Diurnal
15	Accipitridae	<i>Aquila fasciata</i>	Bonelli's Eagle	LC	Diurnal
16	Accipitridae	<i>Aquila heliaca</i>	Imperial Eagle	VU	Diurnal
17	Accipitridae	<i>Aquila nipalensis</i>	Steppe Eagle	EN	Diurnal
18	Accipitridae	<i>Aquila rapax</i>	Tawny Eagle	VU	Diurnal
19	Accipitridae	<i>Ichthyophaga ichthyactes</i>	Grey-headed Fish-Eagle	NT	Diurnal
20	Accipitridae	<i>Ichthyophaga humilis</i>	Lesser Fish-Eagle	NT	Diurnal
21	Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	LC	Diurnal
22	Accipitridae	<i>Butastur teesa</i>	White-eyed Buzzard	LC	Diurnal
23	Accipitridae	<i>Buteo buteo</i>	Common Buzzard	LC	Diurnal
24	Accipitridae	<i>Buteo relictus</i>	Himalayan Buzzard	LC	Diurnal
25	Accipitridae	<i>Buteo rufinus</i>	Long-legged Buzzard	LC	Diurnal
26	Accipitridae	<i>Pernis apivorus</i>	European Honey-buzzard	LC	Diurnal
27	Accipitridae	<i>Pernis ptilorhynchus</i>	Oriental Honey-buzzard	LC	Diurnal
28	Accipitridae	<i>Circus pygargus</i>	Montagu's Harrier	LC	Diurnal
29	Accipitridae	<i>Circus melanoleucos</i>	Pied Harrier	LC	Diurnal
30	Accipitridae	<i>Circus macrourus</i>	Pallid Harrier	NT	Diurnal
31	Accipitridae	<i>Circus aeruginosus</i>	Western Marsh Harrier	LC	Diurnal
32	Accipitridae	<i>Gyps bengalensis</i>	White-rumped Vulture	CR	Diurnal
33	Accipitridae	<i>Aegypius monachus</i>	Cinereous Vulture	NT	Diurnal
34	Accipitridae	<i>Gyps fulvus</i>	Griffon Vulture	LC	Diurnal
35	Accipitridae	<i>Gyps himalayensis</i>	Himalayan Vulture	NT	Diurnal
36	Accipitridae	<i>Gyps indicus</i>	Indian Vulture	CR	Diurnal
37	Accipitridae	<i>Sarcogyps calvus</i>	Red-headed Vulture	CR	Diurnal
38	Accipitridae	<i>Neophron percnopterus</i>	Egyptian Vulture	EN	Diurnal
39	Accipitridae	<i>Accipiter nisus</i>	Eurasian Sparrowhawk	LC	Diurnal
40	Accipitridae	<i>Tachyspiza gularis</i>	Japanese Sparrowhawk	LC	Diurnal
41	Accipitridae	<i>Accipiter trivirgatus</i>	Crested Goshawk	LC	Diurnal
42	Accipitridae	<i>Accipiter virgatus</i>	Besra	LC	Diurnal
43	Accipitridae	<i>Accipiter badius</i>	Shikra	LC	Diurnal
44	Falconidae	<i>Falco amurensis</i>	Amur Falcon	LC	Diurnal
45	Falconidae	<i>Falco tinnunculus</i>	Eurasian Kestrel	LC	Diurnal
46	Falconidae	<i>Falco jugger</i>	Laggar Falcon	NT	Diurnal
47	Falconidae	<i>Falco naumanni</i>	Lesser Kestrel	LC	Diurnal
48	Falconidae	<i>Falco peregrinus</i>	Peregrine Falcon	LC	Diurnal

ANNEXURE

S. No.	Family	Scientific Name	Common Name	IUCN status	Activity
49	Falconidae	<i>Falco chicquera</i>	Red-necked Falcon	NT	Diurnal
50	Falconidae	<i>Falco peregrinus peregrinator</i>	Shaheen Falcon	LC	Diurnal
51	Falconidae	<i>Falco subbuteo</i>	Eurasian Hobby	LC	Diurnal
52	Pandionidae	<i>Pandion haliaetus</i>	Osprey	LC	Diurnal
53	Strigidae	<i>Athene brama</i>	Spotted Owlet	LC	Nocturnal
54	Strigidae	<i>Asio flammeus</i>	Short-eared Owl	LC	Nocturnal
55	Strigidae	<i>Bubo bengalensis</i>	Indian Eagle-Owl	LC	Nocturnal
56	Strigidae	<i>Bubo nipalensis</i>	Spot-bellied Eagle-Owl	LC	Nocturnal
57	Strigidae	<i>Glaucidium radiatum</i>	Jungle Owlet	LC	Nocturnal
58	Strigidae	<i>Ketupa zeylonensis</i>	Brown Fish-Owl	LC	Nocturnal
59	Strigidae	<i>Ketupa coromanda</i>	Dusky Eagle-Owl	LC	Nocturnal
60	Strigidae	<i>Ninox scutulata</i>	Brown Boobook	LC	Nocturnal
61	Strigidae	<i>Otus bakkamoena</i>	Indian Scops-Owl	LC	Nocturnal
62	Strigidae	<i>Otus sunia</i>	Oriental Scops-Owl	LC	Nocturnal
63	Strigidae	<i>Strix leptogrammica</i>	Brown Wood-Owl	LC	Nocturnal
64	Strigidae	<i>Strix ocellata</i>	Mottled Wood-Owl	LC	Nocturnal
65	Tytonidae	<i>Tyto longimembris</i>	Eastern Grass-Owl	LC	Nocturnal
66	Tytonidae	<i>Tyto javanica</i>	Eastern Barn Owl	LC	Nocturnal
67	Tytonidae	<i>Phodilus assimilis</i>	Sri Lanka Bay-Owl	LC	Nocturnal

Appendix 5: Raptor richness and their sightings incidents across districts of Tamil Nadu

District	Number of Sightings	Number of Species
Erode	208	33
The Nilgiris	94	31
Coimbatore	184	29
Salem	207	29
Krishnagiri	230	28
Madurai	160	27
Tiruppur	202	27
Dharmapuri	137	25
Theni	123	23
Dindigul	120	21
Kanniyakumari	124	21
Thoothukudi	195	18
Virudhunagar	127	18
Ariyalur	128	16
Tiruvallur	55	16
Tirunelveli	178	16
Tiruchirappalli	125	15
Tiruvannamalai	108	15
Kallakurichi	89	14
Sivaganga	113	14
Chengalpattu	52	12
Pudukkottai	156	12
Nagapattinam	50	11
Namakkal	40	11
Ramanathapuram	151	10
Ranipet	45	10
Thanjavur	218	10
Cuddalore	76	9
Karur	69	9
Tenkasi	31	9
Tirupathur	65	9
Perambalur	19	8
Vellore	31	8
Mayiladuthurai	75	7
Tiruvarur	109	7
Viluppuram	18	7
Chennai	13	6
Kancheepuram	17	6

TRAINING



AMBASAMUDRAM DIVISION



ARIYALUR DIVISION



CHENNAI DIVISION



POLLACHI DIVISION



PUDUKKOTTAI DIVISION



TIRUPPUR DIVISION



ATTUR DIVISION



NAGAPATTINAM DIVISION

FIELD SURVEY PHOTOS



SPOTTED OWLET

Athene brama

Credits - Chengalpattu Forest Division



JUNGLE OWLET

Glaucidium radiatum

Credits - Dindigul Forest Division



MOTTLED WOOD-OWL

Strix ocellata

Credits - Kalakkad Forest Division



BROWN FISH-OWL

Ketupa zeylonensis

Credits - Hosur Forest Division



ROCK EAGLE-OWL

Bubo bengalensis

Credits - Madurai Forest Division



INDIAN SCOPS-OWL

Otus bakkamoena

Credits - Tiruvallur Forest Division

FIELD SURVEY PHOTOS



MONTAGU'S HARRIER

Credits - Chengalpattu Forest Division

Circus pygargus



BOOTED EAGLE

Credits - Coimbatore Forest Division

Hieraaetus pennatus



GREATER SPOTTED EAGLE

Credits - Coimbatore Forest Division

Clanga clanga



TAWNY EAGLE

Credits - Coimbatore Forest Division

Aquila rapax



WESTERN MARSH HARRIER

Credits - Cuddalore Forest Division

Circus aeruginosus



ORIENTAL HONEY BAZZARD

Credits - Hosur Forest Division

Pernis ptilorhynchus

FIELD SURVEY PHOTOS



BLACK BAZA

Credits - Erode Forest Division

Aviceda leuphotes



LESSER FISH-EAGLE

Credits - Hosur Forest Division

Ichthyophaga humilis



EURASIAN KESTREL

Credits - Trichy Forest Division

Falco tinnunculus



BLACK KITE

Credits - Thoothukudi Forest Division

Milvus migrans



PALLID HARRIER

Credits - Tiruppur Forest Division

Circus macrourus

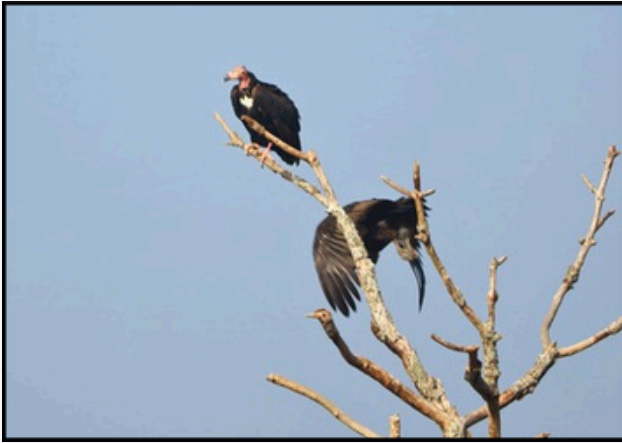


EURASIAN KESTREL

Credits - Theni Forest Division

Falco tinnunculus

FIELD SURVEY PHOTOS



RED-HEADED VULTURE

Credits - Masinagudi Forest Division

Sarcogyps calvus



WHITE-RUMPED VULTURE

Credits - Sathyamangalam Forest Division

Gyps bengalensis



BRAHMINY KITE

Credits - Pollachi Forest Division

Haliastur indus



BROWN BOOBOOK

Credits - Erode Forest Division

Ninox scutulata



SHORT-TOED SNAKE EAGLE

Credits - Hosur Forest Division

Circaetus gallicus



ORIENTAL SCOPS OWL

Credits - Udhagai Forest Division

Otus sunia

Lesser Fish Eagle

Ichthyophaga humilis





Contact us

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